2-1974

Macromodular Computer Design, Part 2, Volume 03, Electronic Package Assembly

Computer Systems Laboratory, Washington University

MACROMODULAR COMPUTER DESIGN PART 2 MANUFACTURING DESCRIPTION

VOLUME III

ELECTRONIC PACKAGE ASSEMBLY

Technical Report No. 32

FINAL REPORT - FEBRUARY, 1974
CONTRACT SD-302 (ARPA)

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR COMPUTER DESIGN

FINAL REPORT - CONTRACT SD-302

FEBRUARY, 1974

Technical Report No. 32

PART 2 - MANUFACTURING DESCRIPTION

VOL. III-ELECTRONIC PACKAGE ASSEMBLY

This work has been supported by the Advanced Research Projects Agency of the Department of Defense under Contract SD-302 and by the Division of Research Facilities and Resources of the National Institutes of Health under Grant RR-00396.
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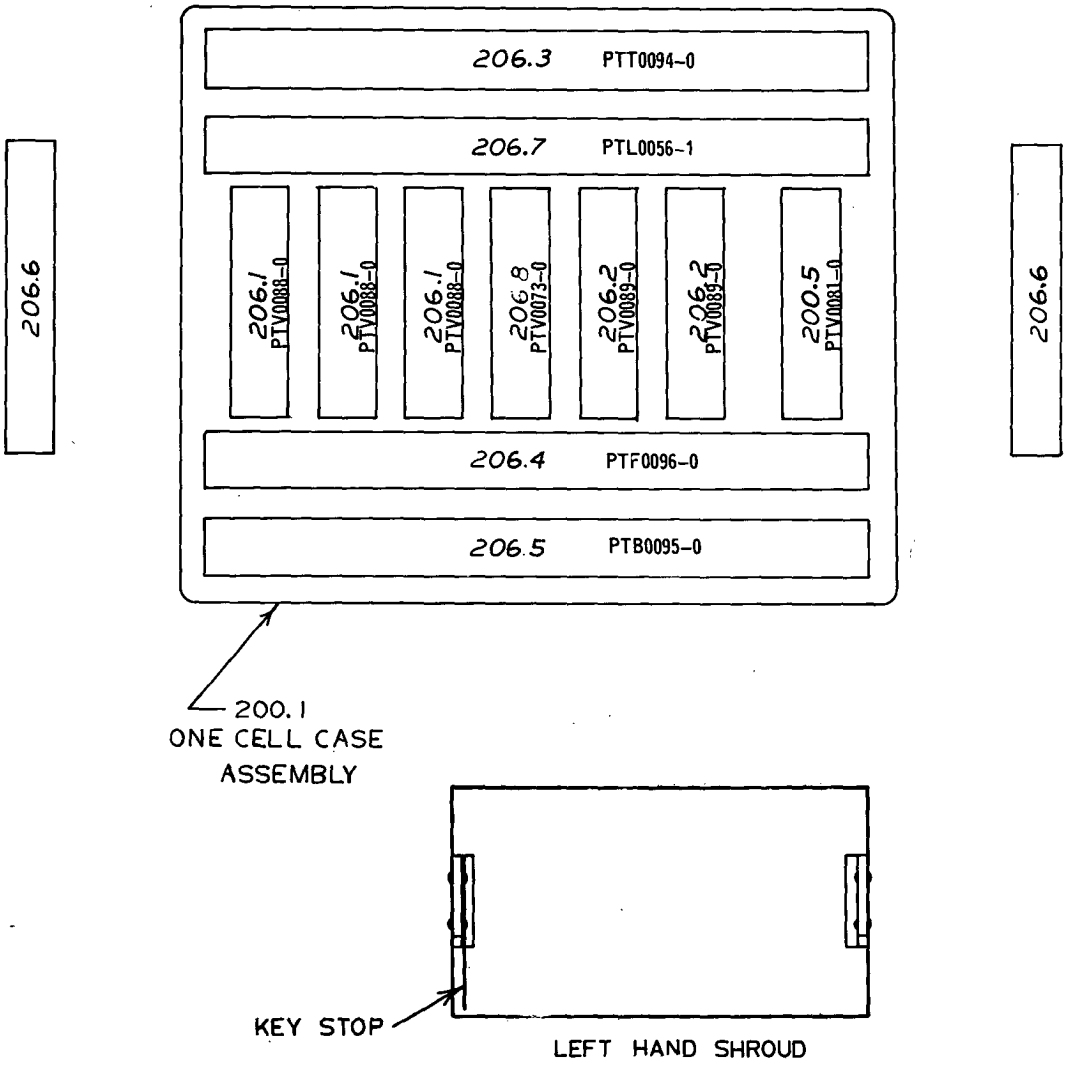
Computer Systems Laboratory
Washington University
St. Louis, Missouri

ABSTRACT

Manufacturing documents, including parts lists, assembly pictorials, and adjustment procedures for the DECODE, LOAD, CALL, MERGE and DATA BRANCH macromodule electronic subassemblies are given.

INDEX



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3	7-27-71	E.C.O. 0213
2	10-28-70	CHANGE PT. NO-TRANS. CONT. B.D.
1	6-18-70	NO. CHANGE ON L.M.B.

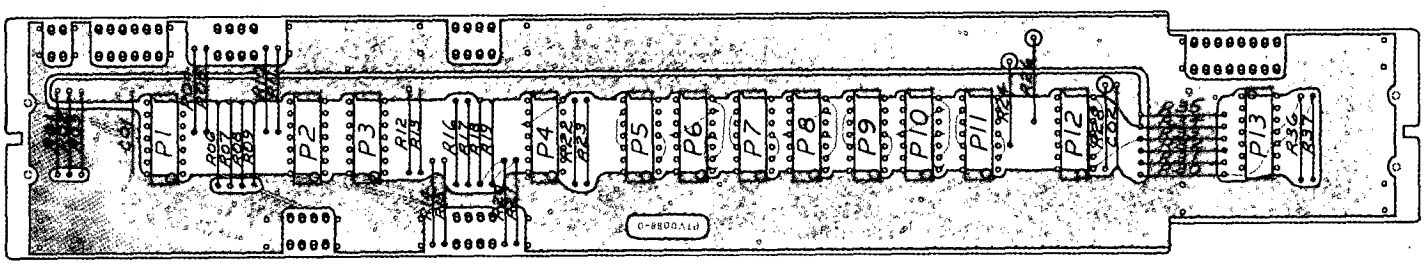
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE ASSEMBLY SCHEMATIC & PARTS LIST
DECODER UNIT
PART NO. 206

APPROVED BY	FOR	DATE
NTK	Document	4/20

ENG	DRAWING NO.
WAC	206.0D
DRAWN BY: PLL	
CHECKED: NTK	DATE: 4-17-70



NOTE: INSTALL FEMALE AMPMODU CONNECTORS EXACTLY AS SHOWN ON DRAWING 200,50D2

CHANGE NO.	DATE	DESCRIPTION
1	1-5-71	E.C.O. 0141

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DECODER DATA BOARD
PART NO. 206.1

APPROVED BY	FOR	DATE
CDM	MMUP	10 6 70

ENG. REO
DRAWN BY PLL
CHECKED
DRAWING NO. 206.1D1
DATE 6-8-70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M04	2	P3
		P4
M06	2	P1
		P2
M10	8	P5
		P6
		P7
		P8
		P9
		P10
		P11
		P12
M20	1	P13

CAPACITORS

TYPE	REQUIRED	LOCATION
CK–103 10,000 pf	2	C01
		C02

RESISTORS

TYPE	REQUIRED	LOCATION
R1	8	R12
		R13
		R18
		R19
		R34
		R35
		R36
		R37
R2	4	R06
		R07
		R08
		R09
R3	19	R04
		R05
		R10
		R11
		R14
		R15
		R16
		R17
		R20
		R21
		R22
		R23
		R24
		R26
		R28
		R30
		R31
		R32
		R33
R4	3	R01
		R02
		R03

CONNECTORS
AMPMODU NO. 85863-4
47 REQUIRED

CIRCUIT BOARD
PTV0088-0
ONE REQUIRED

NOTE:

R1 = 1.5 K OHM 1% FILM RESISTOR
R2 = 750 OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R4 = 15K OHM 5% ¼ WATT CARBON COMP.
CK–103 = SPRAGUE CERAMIC DISC 10,000pf 50 WVDC

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
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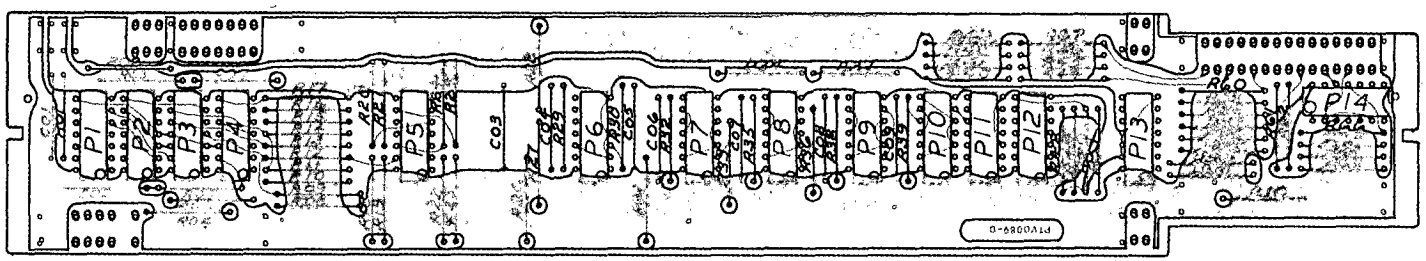
MACROMODULAR PROJECT

TITLE
PARTS LIST
DECODER DATA BOARD
PART NO. 206.1

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
cem	MANUF.	~~6/8/70~~ 27 Oct 70	DRAWN BY MBP	206.1D2
			CHECKED	DATE 6/22/70



NOTE: INSTALL FEMALE AMPMODU CONNECTORS EXACTLY AS SHOWN ON DRAWING 200.50D2

CHANGE NO.	DATE	DESCRIPTION
2	1-4-71	E.C.O. 0139 MTK
1	10-29-70	E.C.O. 0072 MTK

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DECODER CONTROL BOARD
PART NO. 206.2

APPROVED BY	FOR	DATE

ENG. REO
DRAWN BY PLL
CHECKED MTK
DRAWING NO. 206.2D1
DATE 6-8-70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M04	3	P1
		P2
		P12
M06	2	P11
		P13
M07	1	P3
M10	5	P6
		P7
		P8
		P9
		P10
M20	1	P14
M30	1	P5
M31	1	P4

CAPACITORS

TYPE	REQUIRED	LOCATION
CK–103 10,000 pf	3	C01
		C03
		C10
DSM 36 pf	1	C02
DSM 180 pf	2	C04
		C05
DSM 130 pf	4	C06
		C07
		C08
		C09

RESISTORS

TYPE	REQUIRED	LOCATION
R0	3	R04
		R26
		R31
R1	19	R01
		R03
		R06
		R12
		R13
		R14
		R15
		R20
		R21
		R24
		R25
		R28
		R34
		R37
		R48
		R50
		R63
		R64
		R65
R2	15	R05
		R29
		R30
		R32
		R35
		R38
		R39
		R40
		R41
		R42
		R43
		R53
		R54
		R55
		R56

RESISTORS (cont)

TYPE	REQUIRED	LOCATION
R3	17	R02
		R07
		R08
		R09
		R10
		R11
		R16
		R18
		R19
		R22
		R23
		R27
		R33
		R36
		R49
		R51
		R66
R4	1	R17
R5	10	R44
		R45
		R46
		R47
		R57
		R58
		R59
		R60
		R61
		R62

CONNECTORS
AMPMODU NO. 85863–4
48 REQUIRED

CIRCUIT BOARD
PTV0089–0
ONE REQUIRED

NOTE:

R0 = JUMPERS
R1 = 1.5K OHM 1% FILM RESISTOR
R2 = 750 OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R4 = 15K OHM 5% 1/4 WATT CARBON COMP.
R5 = 57.6 OHM 1% FILM RESISTOR

CK–103 SPRAGUE CERAMIC DISC, 50 WVDC
DSM – DIPPED SILVER MICA 5%

CHANGE NO.	DATE	DESCRIPTION
1	2/3/71	E.C.O. 0153 TTK.

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
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MACROMODULAR PROJECT

TITLE
PARTS LIST
DECODER CONTROL BOARD
PART NO. 206.2

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
Cam	MANUF.	6/8/70	REO	206.2D2
			DRAWN BY MBP	
			CHECKED TTK	DATE 6/22/70

270c470

Test Procedure

Decode Module Control Board #206.2

This board contains several critical delays whose proper value must be checked on each board prior to assembly into a Decode Module. The delays must be properly set if the module is to perform its intended operations.

Procedure

Test 1:

Apply a differential square wave with a period of 400 nanoseconds to pins F5 and F6. The signal should have a rise and fall time not greater than 10 nanoseconds. Observe the waveform at pin F6 with channel 1 of a 454 oscilloscope and observe the waveform at pin 12 of package 4 with channel 2. The waveforms will appear approximately as shown in Figure 1. The value of the smaller of t_1 and t_2 must be greater than 200 nanoseconds. If either t_1 or t_2 is less than 200 nanoseconds, the value of C05 and/or C04 should be increased.

If either t_3 or t_4 is smaller than 15 nanoseconds, the value of C02 must be increased. Record the capacitor and delay values for each module on the worksheet provided.

Test 2:

The Tektronix 2101 and Data Pulse 111 pulse generators are required for this test.

ISSUE	-	1-21-71	
1	0302	1-15-74	MJS

Set the Tektronix pulse generator to generate a 200 nanosecond pulse every 400 nanoseconds with MECL output levels on the + and - outputs. Set the Datapulse generator to external trigger and connect a cable from the Tektronix synch output to the external input of the Datapulse generator. Set the Data pulse generator delay to zero and set a positive going output pulse 90 nanoseconds wide with 5 nanosecond rise and fall times. Increase the Datapulse delay setting until reliable triggering is achieved with one output pulse from the Datapulse generator every 800 ns (i.e. every other pulse output from the Tektronix generator). Adjust the delay setting of the Tektronix pulse generator until the leading edge of the 90 ns pulse occurs approximately 10 ns before a transition of the square wave. The two waveforms should appear as shown in Figure 2.

Tie pin T86 low and tie pins F5 and F6 to -5.2V. Connect the output pulse from the datapulse generator to pin B86 and the + output from the Tektronix pulse generator to pin B81. Set B85 and B84 low and observe the waveform at pin 4 of package 3 with channel one of a 454 oscilloscope and observe the waveform at pin 6 of package 10 with channel 2. Use B sweep delayed by A with A set to 500 ns/div, B set to 100 ns/div and the x10 magnifier on. This gives an effective sweep speed of 10 ns/division. For each pulse on channel 1, the signal on channel 2 must change state and the change must occur at least 5 ns before the end of the pulse. Figure 3 shows the required timing relation and this relation must be checked for at least six successive pulses. Note that the pulses occur in groups

of three. If the signal on channel 2 does not change at least 5 ns before the end of the pulse the value of C02 must be increased. If C02 is changed, then the entire test procedure under "Test 2" must be repeated.

Next, observe pin 5 of package 10 with channel 2 of the oscilloscope. The level, other than the times at which the signal is switching, must not be within the range of -.900 volts to -1.450 volts. This level must be checked for a range spanning at least 6 pulses on channel 1. Figure 4 shows the expected waveforms.

Next connect pin B81 to the -output of the Tektronix pulse generator instead of the +output and repeat the previous measurement on pins 6 and 5 of package 10. The above sequence of measurements must be repeated 3 more times as shown in the following table. The worksheet provided with each board should be filled in as the measurements are made to insure that no measurements are overlooked.

B84	B85	Oscilloscope Channel 1	Oscilloscope Channel 2 for Timing Measurement	Oscilloscope Channel 2 for Level Measurement
L	L	Package 3 Pin 4	Package 10 Pin 6	Package 10 Pin 5
L	H	" 3 " 9	" 8 " 6	" 8 " 5
H	H	" 2 " 5	" 7 " 6	" 7 " 5
H	L	" 3 " 10	" 9 " 6	" 9 " 5

When the tests are completed, the circuit board should be carefully inspected to insure that the foregoing procedure has

not resulted in damage to the circuit board, particularly in areas where fresh soldering has taken place. All flux residues should be thoroughly removed.

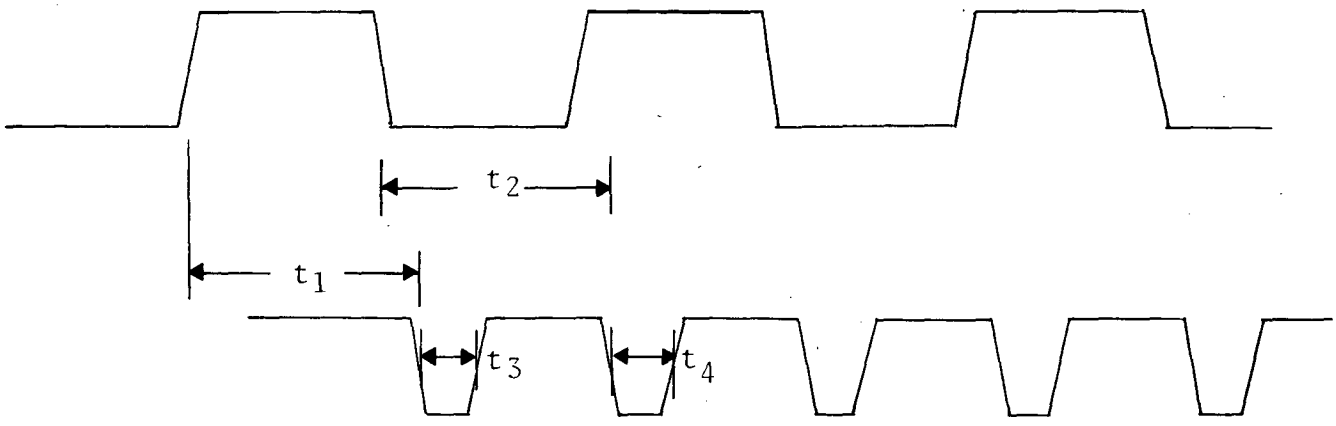


FIGURE 1

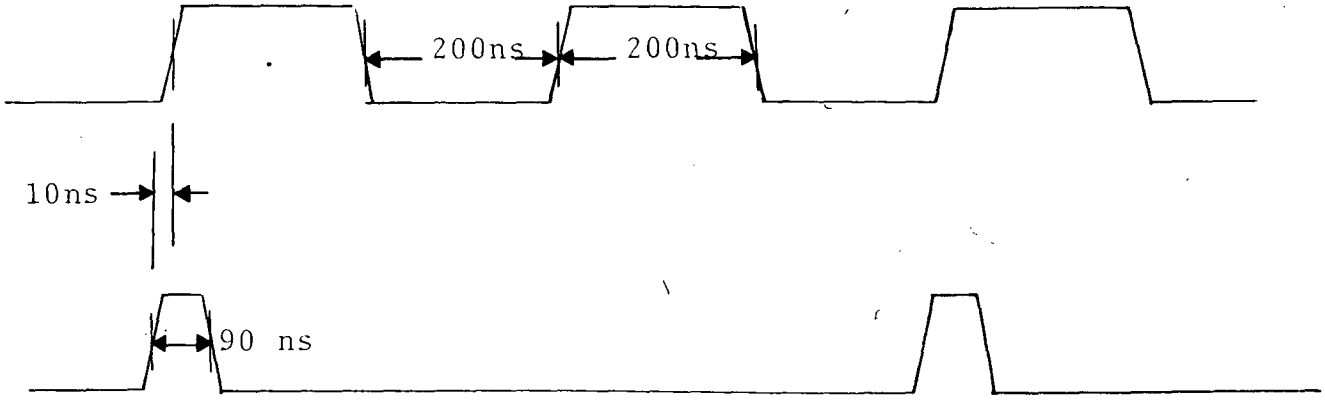


FIGURE 2

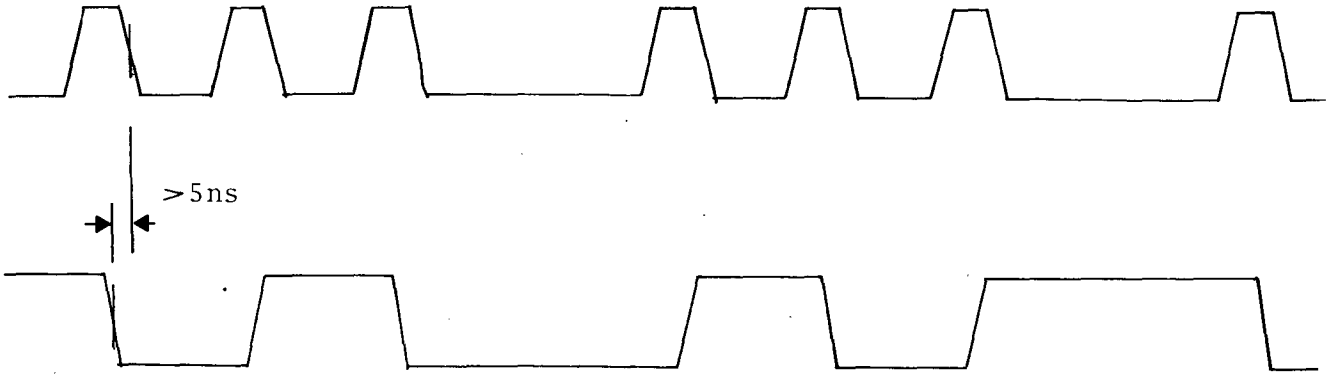


FIGURE 3

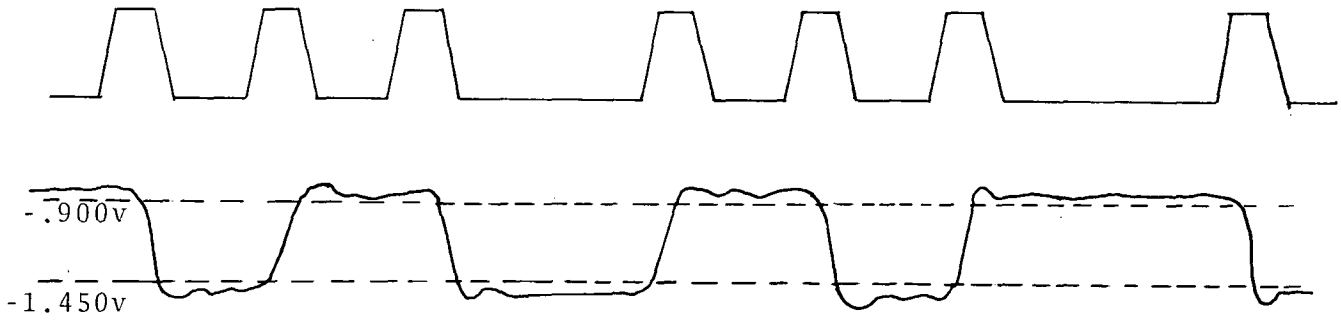
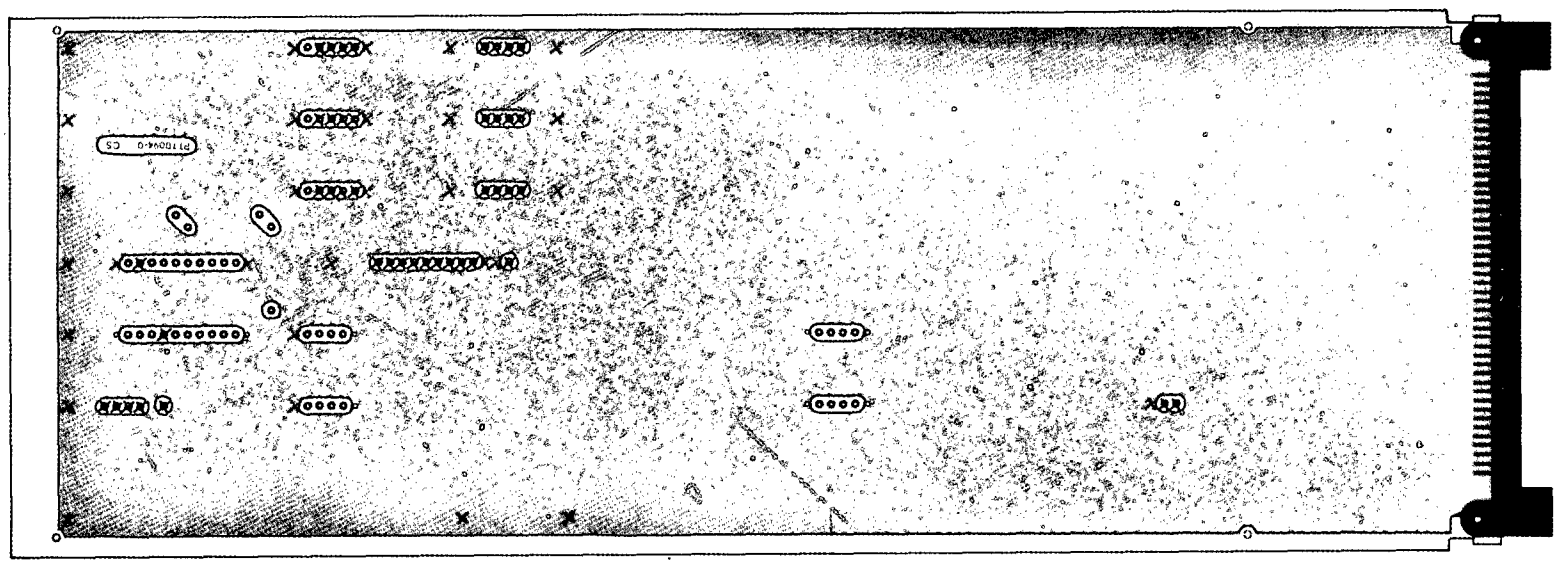


FIGURE 4



NOTE: SEE DRAWING NUMBER 200.50D26 FOR CONNECTOR ORIENTATION.

NOTE: MALE AMP MODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2. (72 PINS)

CHANGE NO.	DATE	DESCRIPTION
1	12-1-70	E.C.O. 0097 Cam

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DECODER TOP MOTHERBOARD CONNECTOR ASSEMBLY
PART NO. 206.3

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
Cam	MANUF	23 Oct 70	REO	206.3D1
			DRAWN BY PLL	
			CHECKED MTR	DATE 6-8-70

AMP CONNECTOR 1-202845-5
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
72 REQUIRED

CIRCUIT BOARD
PTT0094-0
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION

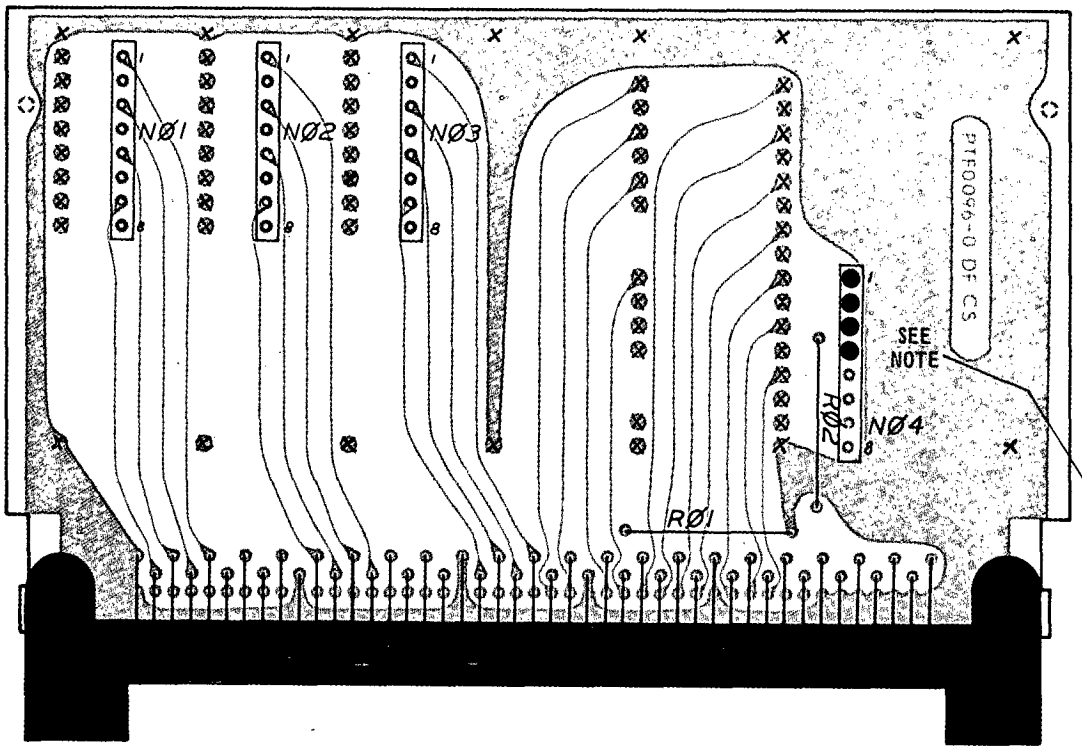
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODÚLAR PROJECT

TITLE PARTS LIST
DECODER TOP MOTHERBOARD CONNECTOR ASSEMBLY
PART NO. 206.3

APPROVED BY	FOR	DATE	ENG. REO.	DRAWING NO.
Cam	MANUF.	~~6/15/70~~	DRAWN BY MJP	206.3D2
			CHECKED	DATE 6/22/70

230ct70



NOTE: CLIP PINS 1, 2, 3 AND 4 FROM LTN-2 IN POSITION N04.

NOTE: MALE AMP MODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2. (64 PINS)

NOTE: SEE DRAWING NUMBER 200.50D29 FOR CONNECTOR ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION
1	11-16-70	E.C.O. 0082 NTK CBM

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
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MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
DECODER FACEPLATE CONNECTOR ASSEMBLY
PART NO. 206.4

APPROVED BY	FOR	DATE
CBM	MANUF	10/22/70

ENG. REO
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 206.4D1
DATE 6/8/70

JUMPER
ONE REQUIRED
R01

RESISTOR 15K OHM 5% ¼ WATT CARBON COMP.
ONE REQUIRED
R02

SPRAGUE NETWORK LTN-2
FOUR REQUIRED
N01
N02
N03
N04 *

*CLIP PINS 1, 2, 3 AND 4
FROM LTN-2 IN POSITION N04

CONNECTOR AMP 583 464-1
ONE REQUIRED

CONNECTORS
AMPMODU NO. 85931-5
64 REQUIRED

CIRCUIT BOARD
PTF0096-0
ONE REQUIRED

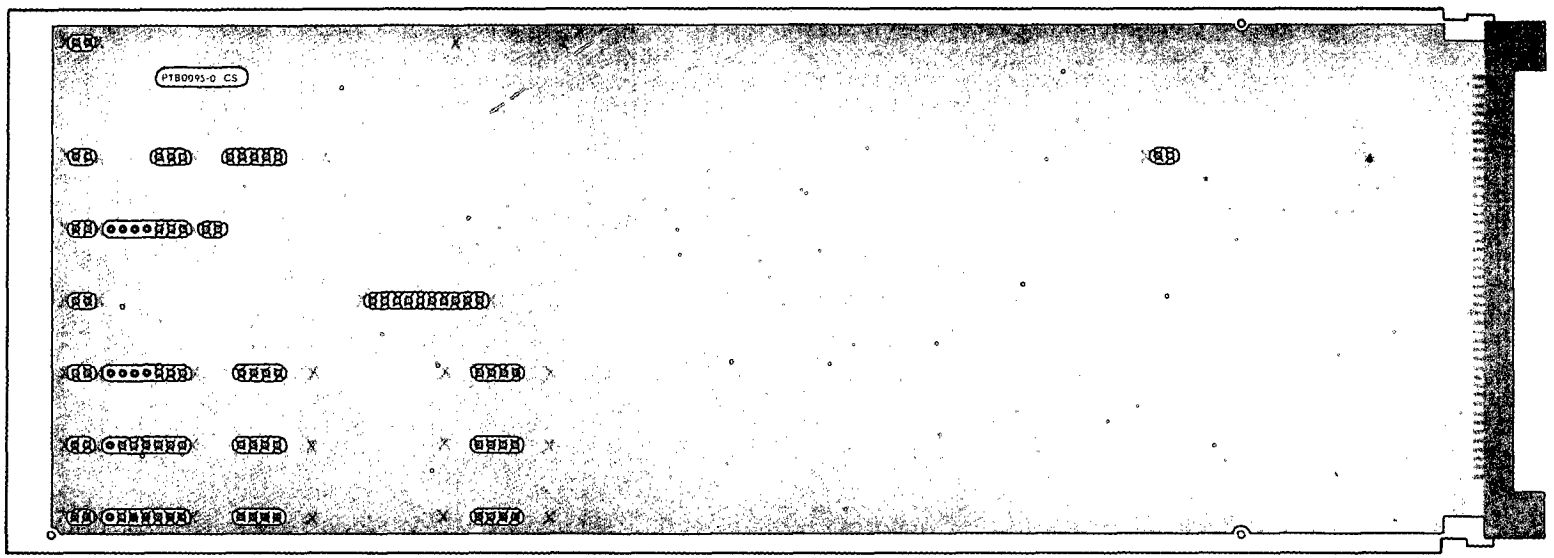
CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
DECODER FACEPLATE MOTHER BOARD
PART NO. 206.4

APPROVED BY	FOR	DATE	ENG. R=O	DRAWING NO.
Cerm	MANUF.	~~6/8/70~~ 23oct70	DRAWN BY MBP	206.4D2
			CHECKED MTK	DATE 6/22/70



NOTE: MALE AND AMP MODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.
(112 PINS)

NOTE: SEE DRAWING NUMBER 200.50D27 FOR CONNECTOR ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
DECODER BOTTOM MOTHERBOARD ASSEMBLY
PART NO. 206.5

APPROVED BY	FOR	DATE
CBM	MANUF.	2/26/70

ENG. REO
DRAWN BY PLL
CHECKED TTR
DRAWING NO. 206.5D1
DATE 6/12/70

AMP CONNECTOR 1-202845-5
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
ONE HUNDRED TWELVE REQUIRED

CIRCUIT BOARD
PTB0095-0
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
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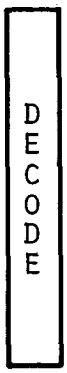
MACROMODULAR PROJECT

TITLE
PARTS LIST
DECODER BOTTOM MOTHERBOARD ASSEMBLY
PART NO. 206.5

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG. R.E.O.	DRAWING NO.
cam	MANUF.	~~6/12/70~~	DRAWN BY MBP	206.5D2
			CHECKED MP!	DATE 6/22/70

280c470



METALCRAFT "AUTOGRAPH" OR EQUIVALENT:
BLANK SIZE: $\frac{1}{4}$" X 2" SHEARED WITH
SQUARE CORNERS. BLACK LETTERS, VOGUE
BOLD 12 POINT BOLD FACE TYPE CENTERED
TOP, BOTTOM AND SIDES WITH 6 POINT
SPACING ON LIGHT OLIVE PMS 458 BACKING
MANUFACTURED FROM .016 THICK ALUMINUM
WITH SOLVENT ACTIVATED PERMANENT
ADHESIVE BACKING.

NOTE: PANTONE MATCHING SYSTEM (PMS)

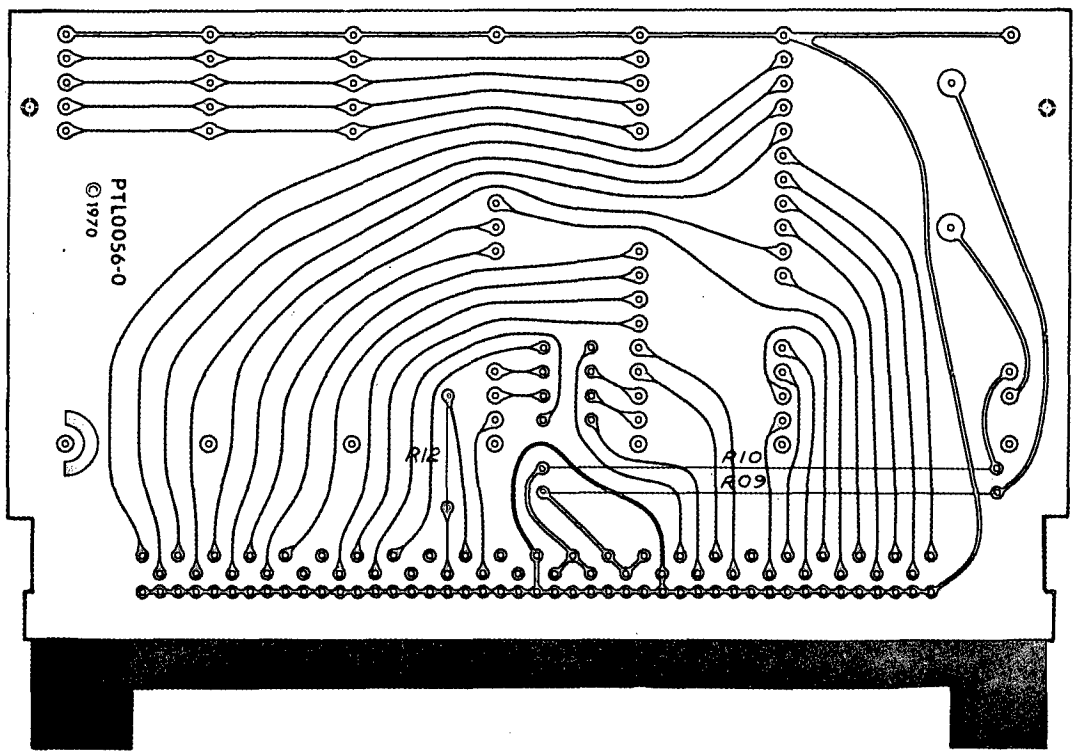
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE

IDENTIFICATION LABEL
DECODE MODULE
PART #206.6

APPROVED			ENG	DRAWING NO.
BY	FOR	DATE	NTK	206.6D
MAW	Prod.	7/28/70	DRAWN BY KM	
			CHECKED MAW	DATE 6-16-70



CHANGE NO.	DATE	DESCRIPTION
1	12-1-70	E.C.O. 0097 cem

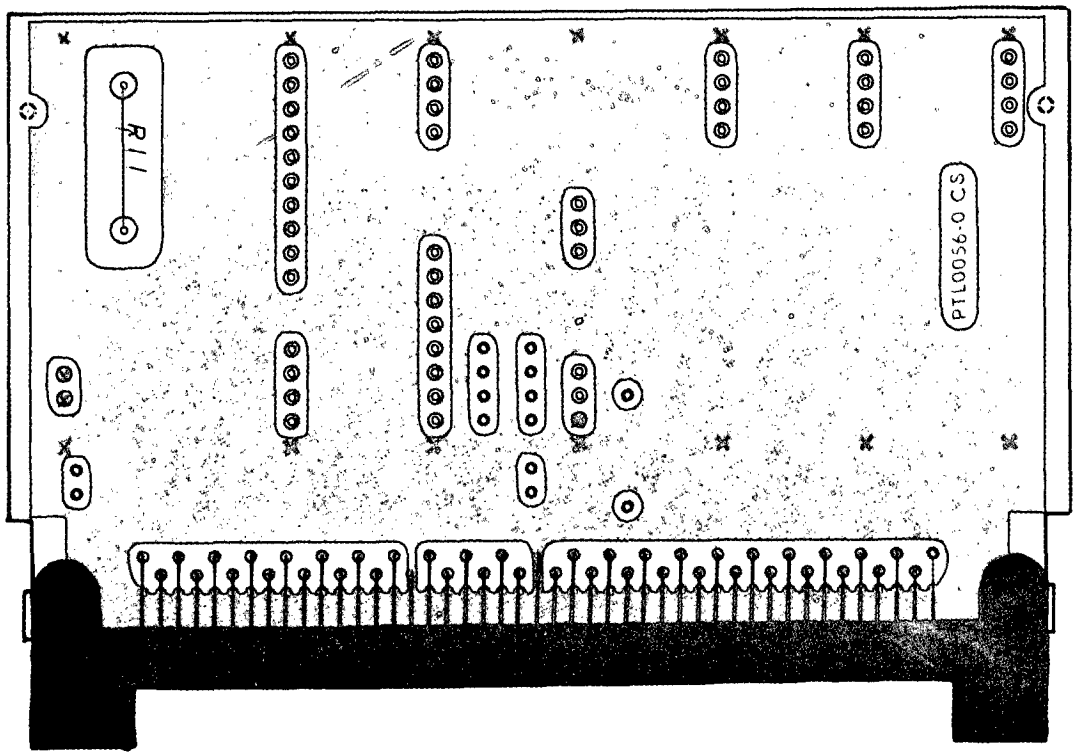
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DECODER LATERAL MOTHERBOARD ASSEMBLY SIGNAL SIDE
PART NO. 206.7

APPROVED BY	FOR	DATE
cem	MANUF	12-01-70

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 206.7D1
DATE 6-19-70



NOTE: MALE AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.
(17 PINS)

NOTE: SEE DRAWING NUMBER 200.50D28 FOR CONNECTOR ORIENTATION.

CHANGE NO	DATE	DESCRIPTION
1	12-1-70	E.C.O. 0097 Cam

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
DECODER LATERAL MOTHERBOARD ASSEMBLY COMPONENT SIDE
PART NO. 206.7

APPROVED BY	FOR	DATE
Cam	MANUF.	2Dec 70

ENG. DLS
DRAWN BY
CHECKED NTK
DRAWING NO. 206.7D2
DATE 10-20-70

JUMPERS
TWO REQUIRED
R09
R10

RESISTOR 30.9K OHM 1% FILM
R12

CONNECTOR
AMPMODU NO. 85931-5
17 REQUIRED

AMP CONNECTOR
583 464-1
ONE REQUIRED

CIRCUIT BOARD
PTL0056-1
ONE REQUIRED

FUSE BUSSMAN GFA 3/4 AMP
ONE REQUIRED
R11

CHANGE NO.	DATE	DESCRIPTION
3	7-27-71	E.C.O. 0213
2	12-1-70	E.C.O. 0097
1	10-20-70	E.C.O. 0062

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

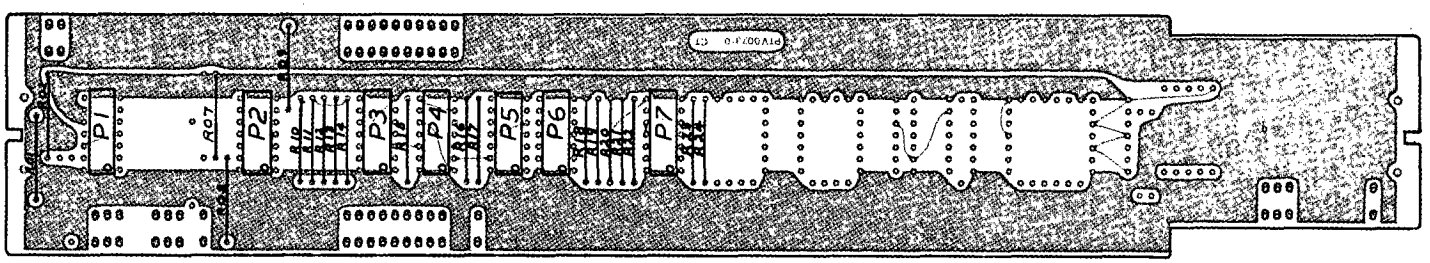
MACROMODULAR PROJECT

TITLE: PARTS LIST
DECODER LATERAL MOTHERBOARD ASSEMBLY
PART NO. 206.7

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG. REO.	DRAWING NO. 206.7D3
	MANUF	6/18/70	DRAWN BY MBP	
			CHECKED	DATE 6/18/70

230ct70

NOTE:
INSTALL FEMALE AMPMODU CONNECTORS
EXACTLY AS SHOWN ON DWG. 200.50D2.



CHANGE NO.	DATE	DESCRIPTION
2	1-15-74	E.C.O. 0302 MS
1	12-1-70	E.C.O. 0097 Cem

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DECODER TRANSFER CONTROL BOARD
PART NO. 206.8

APPROVED BY	FOR	DATE
Cem	MANUF.	~~2-28-70~~
		3-10-70

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 206.8D1
DATE 10/28/70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M04	1	P3
M06	3	P2
		P6
		P7
M10	3	P1
		P4
		P5

RESISTORS

TYPE	REQUIRED	LOCATION
R1	3	R02
		R11
		R12
R2	5	R07
		R10
		R20
		R21
		R24
R3	10	RO1
		R08
		R09
		R13
		R14
		R15
		R17
		R19
		R22
		R23
R4	2	R16
		R18

CONNECTORS
AMP MODU NO. 85863-4
47 REQUIRED

CIRCUIT BOARD
PTV0073-1
ONE REQUIRED

NOTE:

R1 = 1.5K OHM 1% FILM RESISTOR
R2 = 750 OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R4 = 15K OHM 5% CARBON COMP.

CHANGE NO.	DATE	DESCRIPTION
2	1-15-74	E.C.O. 0302 MJ3
1	7-20-72	CORR. REV. LEVEL ON P.C. BOARD

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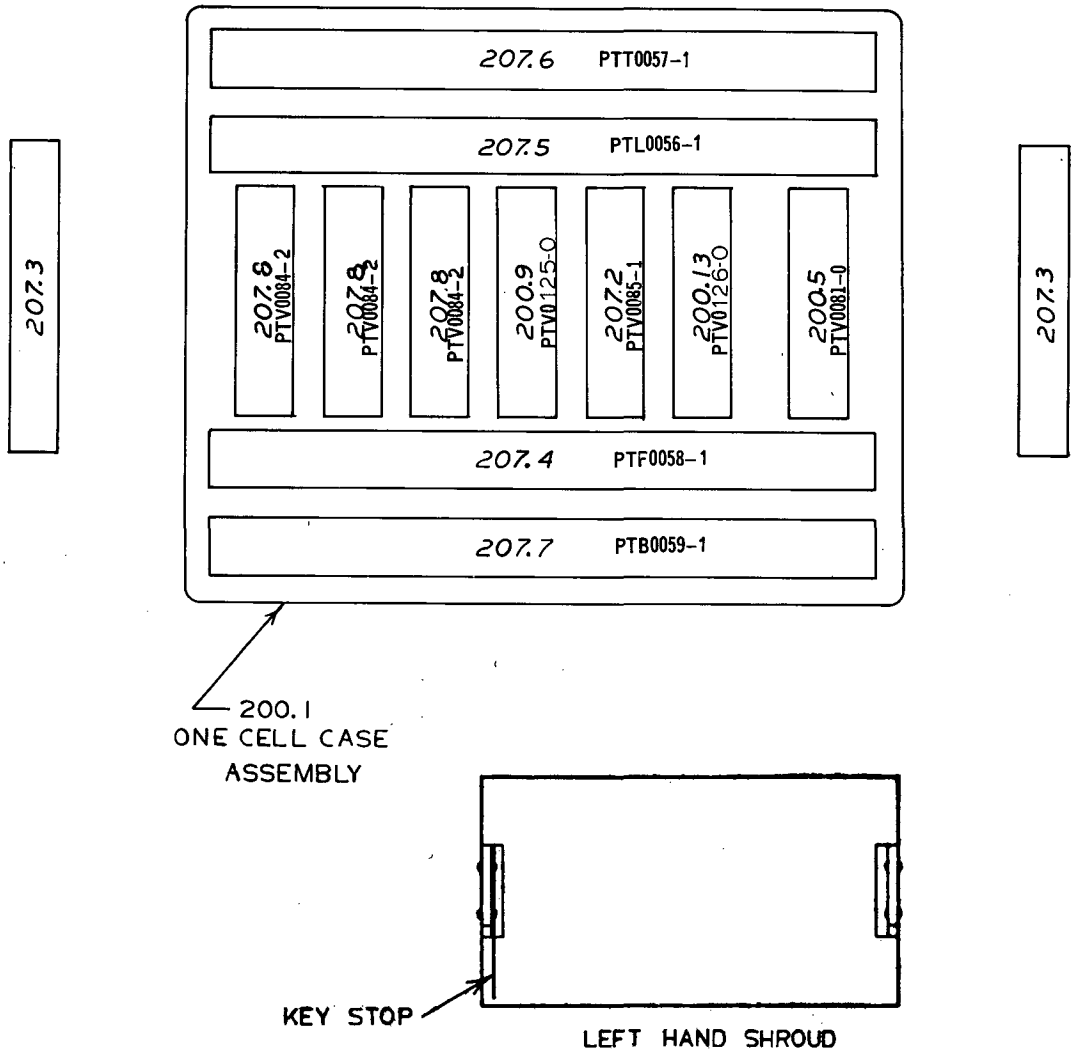
MACROMODULAR PROJECT

TITLE
PARTS LIST
DECODER TRANSFER CONTROL BOARD
PART NO. 206.8

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
Com	MANUF.	3Nov70	REO	206.8D2
			DRAWN BY MBP	
			CHECKED NTK	DATE 10-28-70



CHANGE NO.	DATE	DESCRIPTION
6	11-30-71	E.C.O. 0234 NTK.
5	7-27-71	E.C.O. 0214 NTK.
4	11-11-70	E.C.O. 0080 NTK.
3	6-18-70	NO. CHANGE ON L.M.B.
2	6-11-70	NO. CHANGE ON F.P.M.P.
1	4-17-70	CHANGED F.P.M.B.

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WASHINGTON UNIVERSITY
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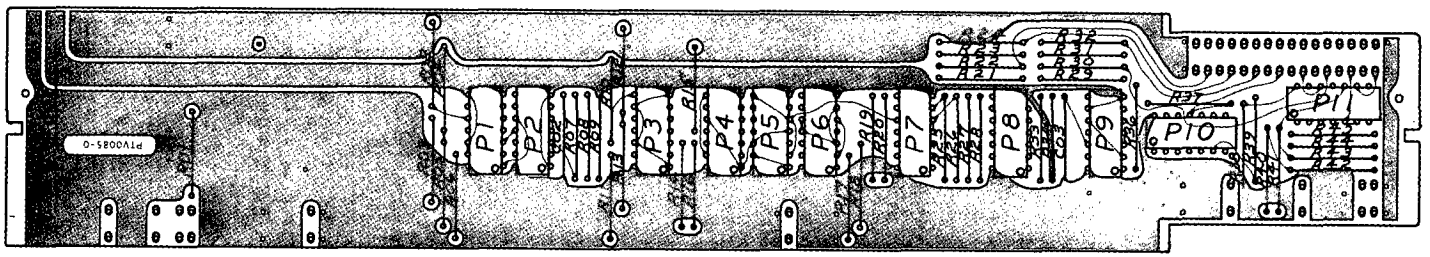
MACROMODULAR PROJECT

TITLE ASSEMBLY SCHEMATIC & PARTS LIST
LOAD UNIT
PART NO. 207

APPROVED BY	APPROVED FOR	APPROVED DATE
NTK	Computer WAC	

ENG	WAC
DRAWN BY	PLL
CHECKED	NTK
DRAWING NO.	207.0D
DATE	3-28-70

NOTE:
INSTALL FEMALE AMPMODU CONNECTORS
EXACTLY AS SHOWN ON DRAWING 200.50D2.



CHANGE NO.	DATE	DESCRIPTION
2	11-11-70	E.C.O. 0080 NTK cem
1	6-3-70	CORR. RESISTOR IDENTIFICATION, R16 cem

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MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
LOAD CONTROL BOARD
PART # 207.2

APPROVED BY	FOR	DATE
cem	MANUF.	7/8/70
cem	MANUF.	11/30/71

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 207.2D1
DATE 5/11/70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M06	2	P7 P8
M09	1	P1
M10	3	P2 P3 P9
M11	2	P5 P6
M20	1	P11
M30	1	P4
M35	1	P10

TYPE	REQUIRED	LOCATION
10,000 pf	1	C01
100 pf	1	C02
510 pf	1	C03

CONNECTORS
AMPMODU NO. 85863-4
42 REQUIRED

CIRCUIT BOARD
PTV0085-1
ONE REQUIRED

RESISTORS

TYPE	REQUIRED	LOCATION
R0	7	R01 R06 R14 R17 R18 R38 R39
R1	7	R09 R10 R12 R15 R42 R43 R44
R2	12	R02 R04 R07 R08 R19 R20 R25 R26 R27 R28 R33 R34
R3	8	R03 R05 R11 R13 R16 R40 R41 R45
R4	1	R36

RESISTORS (cont)

TYPE	REQUIRED	LOCATION
R5	8	R21 R22 R23 R24 R29 R30 R31 R32
R6	1	R37

NOTE:

C01 SPRAGUE TYPE CK-103
10,000pf 50wvdc
C02 ELEMENCO DIPPED SILVER
C03 MICA 5%

NOTE:
R0 = JUMPERS
R1 = 1.5K OHM 1% FILM RESISTOR
R2 = 750 OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R4 = 15K 5% CARBON COMP
R5 = 57.6 OHM 1% FILM RESISTOR
R6 = 130 OHM 1% FILM RESISTOR

CHANGE NO.	DATE	DESCRIPTION
3	11-30-71	E.C.O. 0234
2	1-21-71	E.C.O. 0149
1	11-11-70	E.C.O. 0080

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MACROMODULAR PROJECT

TITLE: PARTS LIST
LOAD CONTROL BOARD
PART NO. 207.2

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
			DLS	
	MANUF.	5/11/70	DRAWN BY: MBP	207.2D2
	MANUF.		CHECKED	DATE: 6/19/70

Test Procedure

Load Module Control Board #207.2

This board contains one critical delay whose proper value must be checked on each board prior to assembly into a Load Module.

The delay value must be longer than a specified minimum value. If the delay value is excessively large, the operation of the module will be needlessly slowed down. If the delay value is excessively short, the module may perform incorrectly under certain conditions.

Procedure

Test 1: Tie pins L3 and T81 high and tie pins F2, F3, F4 and F5 to -5.2 volts. Apply a square wave signal with a period of 300 nanoseconds or greater to pin T31. The signal should have a rise and fall time not greater than 10 nanoseconds. Observe the waveform at pin T31 with channel one of a 454 oscilloscope. Observe the waveform at pin L2 with the second channel. The delay between the two waveforms, measured from mid-point of each transition, should be 39 nanoseconds or greater. The delay should be observed for both positive and negative going transitions, and both should be 39 nanoseconds or greater. If the smaller of the two delays is less than 39 ns, the value of C02 should be increased. If the smaller of the two delays is greater than 50 nanoseconds, the value of C02 should be reduced.

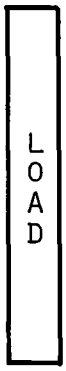
The final capacitor value and the measured delays for each board should be recorded on the test sheet provided for that board, along with the serial num ber of the board.

The circuit board should be carefully inspected to insure that the foregoing procedure has not resulted in damage to the circuit board, particularly in the areas where fresh soldering has taken place. All flux residues should be thoroughly removed.

12-26-70

1 0302 1-15-74 MJS

207.2D4



METALCRAFT "AUTOGRAPH" OR EQUIVALENT:
BLANK SIZE: ¼" X 2" SHEARED WITH
SQUARE CORNERS. BLACK LETTERS, VOGUE
BOLD 12 POINT BOLD FACE TYPE CENTERED
TOP, BOTTOM AND SIDES WITH 6 POINT
SPACING ON MUSTARD PMS 130 BACKING.
MANUFACTURED FROM .016 THICK ALUMINUM
WITH SOLVENT ACTIVATED PERMANENT
ADHESIVE BACKING.

NOTE: PANTONE MATCHING SYSTEM (PMS)

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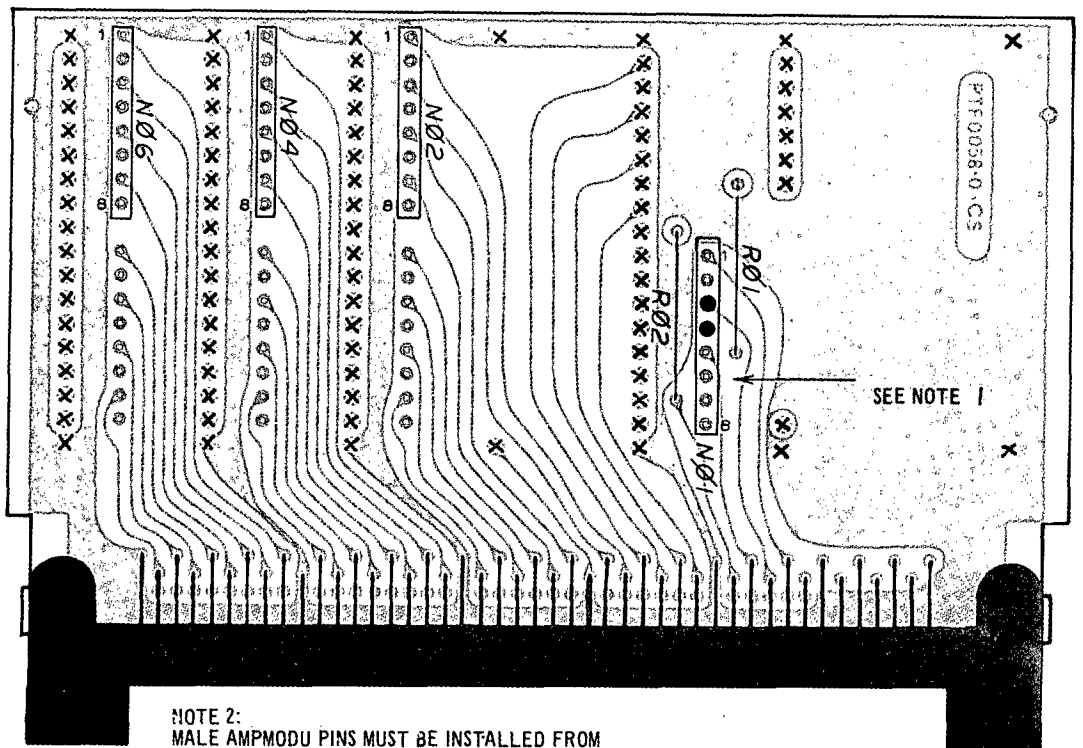
MACROMODULAR PROJECT

TITLE

IDENTIFICATION LABEL
LOAD MODULE
PART #207.3

APPROVED			ENG	DRAWING NO.
BY	FOR	DATE	NTK	207.3D
Maw	Prod.	7/28/70	DRAWN BY KM	
			CHECKED Maw	DATE 6-16-70



NOTE 2:
MALE AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.

NOTE 1: ON SPRAGUE RESISTOR NETWORK LTN-2 IN POSITION NØ1 CLIP LEADS NO. 3 AND 4 SO THAT THEY DO NOT TOUCH BOARD.

NOTE 3:
SEE DRAWING NUMBER 200.50D29 FOR CONNECTOR ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION
1	11-11-70	E.C.O. 0080 NTK cem

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
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MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
LOAD MODULE FACEPLATE MOTHER BOARD
PART NO. 207.4

APPROVED BY	FOR	DATE
cem	MANUF.	7/8/70
cem	MANUF.	11/30/71

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 207.4D1
DATE 6-11-70

RESISTORS 15K OHM 5% CARBON
TWO REQUIRED
R01
R02

SPRAGUE RESISTOR NETWORK LTN-2
FOUR REQUIRED
N01*
N02
N04
N06

*ON LTN-2 IN POSITION N01 CLIP PINS 3 AND 4.

AMP CONNECTOR
583 464-1
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
EIGHTY FIVE REQUIRED

CIRCUIT BOARD
PTF0058-1
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION
2	7-27-71	E.C.O. 0214
1	11-11-70	E.C.O. 0080 MPK,

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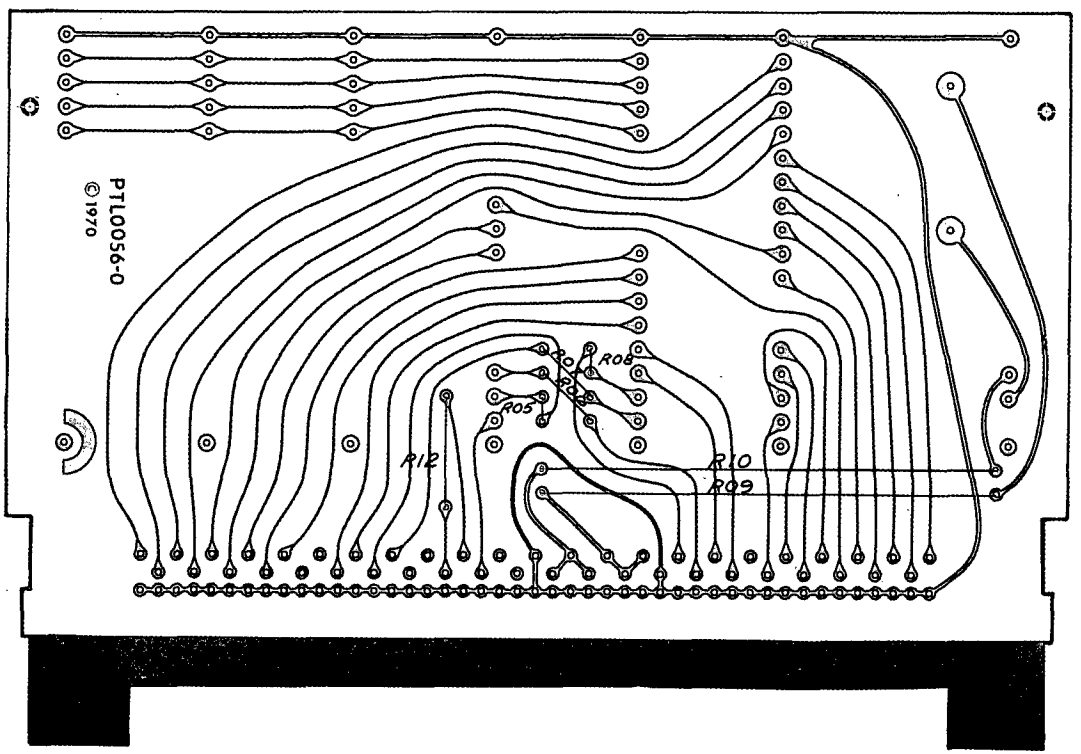
MACROMODULAR PROJECT

TITLE
PARTS LIST
LOAD MODULE FACEPLATE MOTHERBOARD
PART NO. 207.4

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
cem	MANUF.	7/7/70	DRAWN BY MBP	207.4D2
			CHECKED MTK	DATE 7/7/70



CHANGE NO.	DATE	DESCRIPTION
1	11-11-70	E.C.O. 0080 - nbk. cem

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MACROMODULAR PROJECT

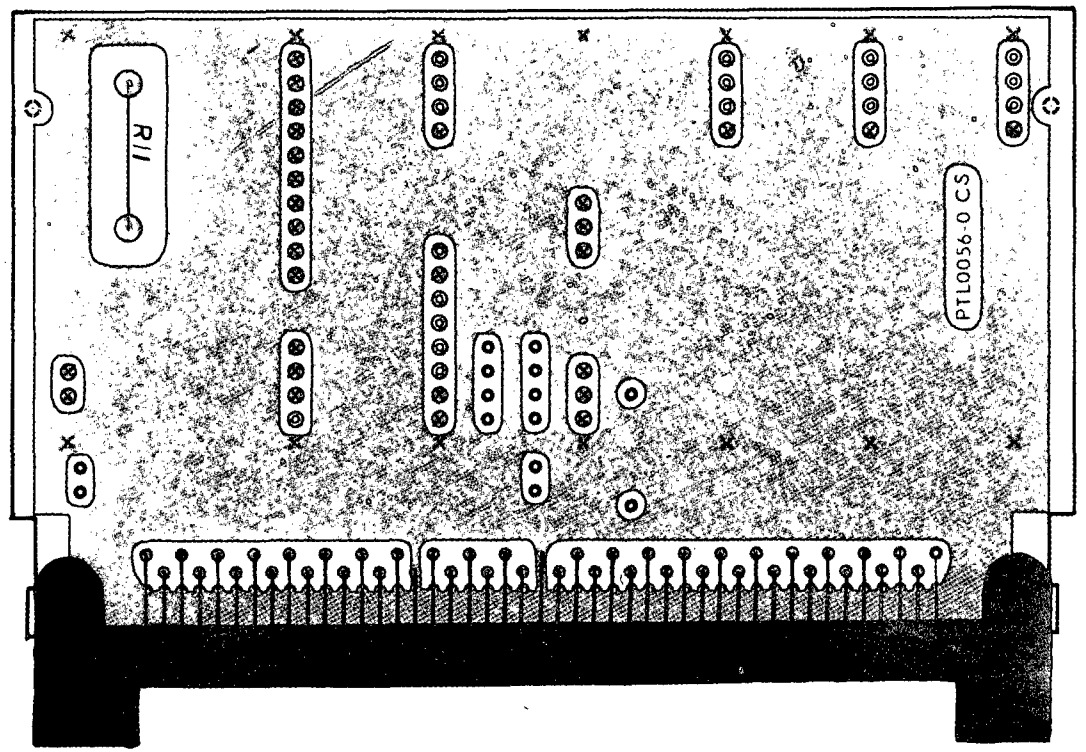
TITLE: COMPONENT IDENTIFICATION
LOAD LATERAL MOTHERBOARD ASSEMBLY SIGNAL SIDE
PART NO. 207.5

APPROVED BY	FOR	DATE
Cem	MANUF.	7/8/70
Cem	MANUF.	11/30/71

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 207.5D1
DATE 6-19-70

NOTE:
AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.

NOTE:
SEE DRAWING NUMBER 200.50D28 FOR CONNECTOR ORIENTATION.



CHANGE NO.	DATE	DESCRIPTION
1	11 24 71	E.C.O. 0232 MRP

COMPUTER SYSTEMS LABORATORY
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MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
LOAD LATERAL MOTHERBOARD ASSEMBLY COMPONENT SIDE
PART NO. 207.5

APPROVED BY	FOR	DATE
Conn	MANUF.	17 NOV 70
Conn	MANUF.	11/30/71

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 207.5D2
DATE 11-11-70

JUMPERS
SIX REQUIRED
R05
R06
R07
R08
R09
R10

RESISTOR 30.9 K OHM 1% FILM
ONE REQUIRED
R12

AMP CONNECTOR
583 464-1
ONE REQUIRED

CONNECTORS
AMPMODU 85931-5
FORTY TWO REQUIRED

FUSE
BUSSMAN GFA ¾A
ONE REQUIRED
R11

CIRCUIT BOARD
PTL0056-1
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION
4	11-24-71	E.C.O. 0232 MKP
3	7-27-71	E.C.O. 0214
2	12-11-70	E.C.O. 0126
1	11-11-70	E.C.O. 0080 MDC

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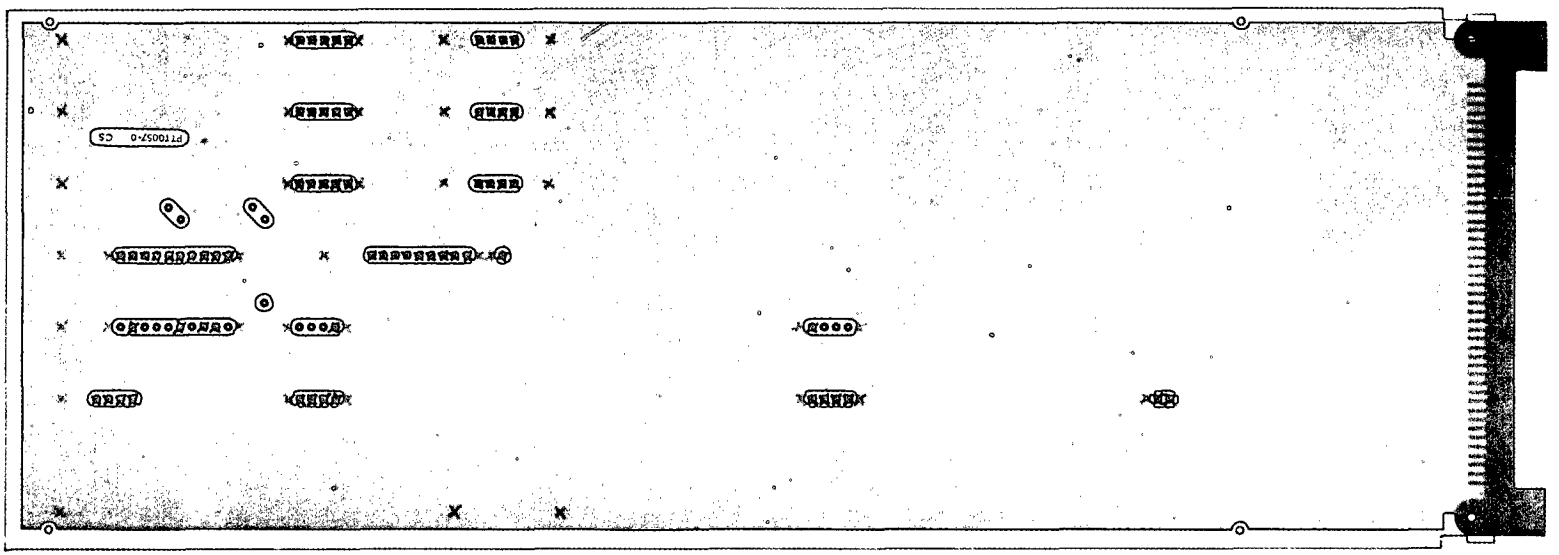
MACROMODULAR PROJECT

TITLE
PARTS LIST
LOAD LATERAL MOTHER BOARD ASSEMBLY
PART NO. 207.5

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG. Rod	DRAWING NO. 207.5D3
Chm	MANUF.	6/19/70	DRAWN BY MBP	
			CHECKED MTK	DATE 6/19/70



NOTE:
SEE DRAWING NUMBER 200.50D26 FOR CONNECTOR ORIENTATION.

NOTE:
MALE AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DWGS. 200.50D1 AND 200.50D2.

CHANGE NO.	DATE	DESCRIPTION

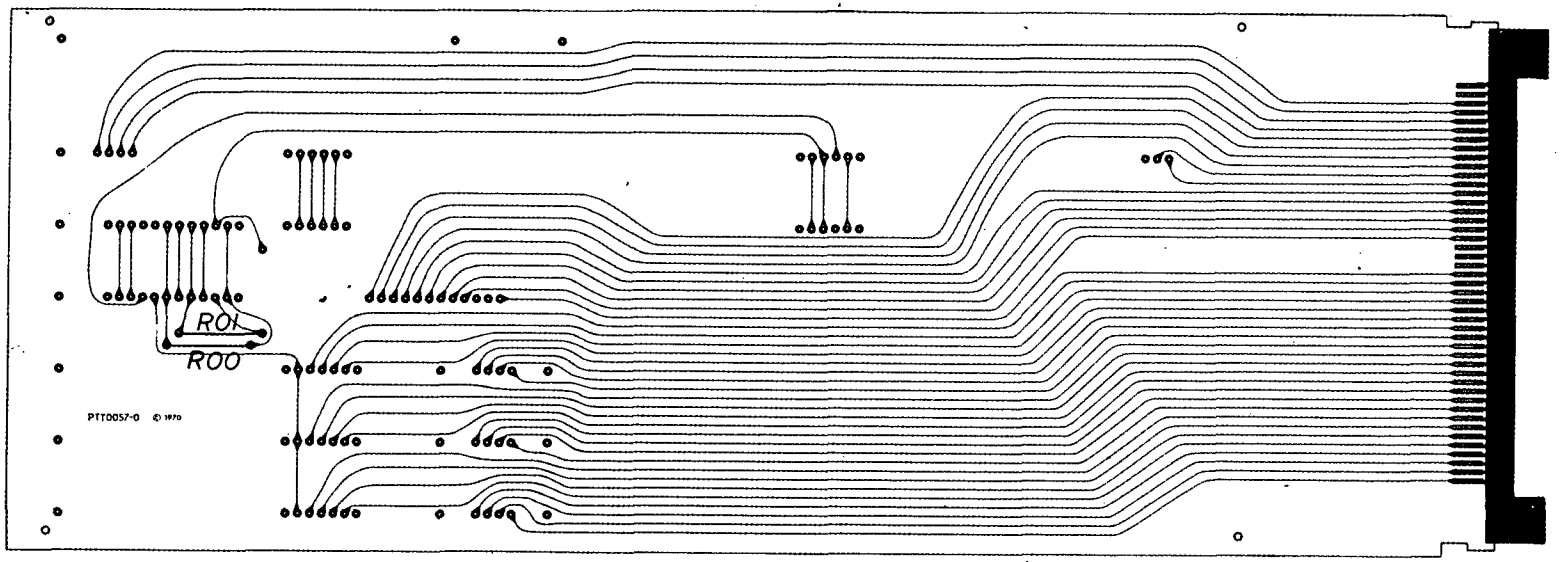
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
LOAD TOP MOTHERBOARD ASSEMBLY COMPONENT SIDE
PART NO. 207.6

APPROVED BY	FOR	DATE
CEM	MANUF.	17NOV.70
CEM	MANUF.	11/30/71

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 207.6D1
DATE 11-11-70



CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
LOAD TOP MOTHER BOARD ASSEMBLY . SIGNAL SIDE
PART NO. 207.6

APPROVED BY	FOR	DATE
Comm.	MANUF	12/04/70
Comm.	MANUF.	11/30/71

ENG. DLS
DRAWN BY PLL
CHECKED NTK

DRAWING NO. 207.6D2
DATE 11-11-70

AMP CONNECTOR
1-202845-5
ONE REQUIRED

CONNECTORS
AMPMODU NO. 85931-5
ONE HUNDRED FOUR REQUIRED

JUMPERS
TWO REQUIRED
R00
R01

CIRCUIT BOARD
PTT0057-1
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION
1	7-27-71	E.C.O. 0214

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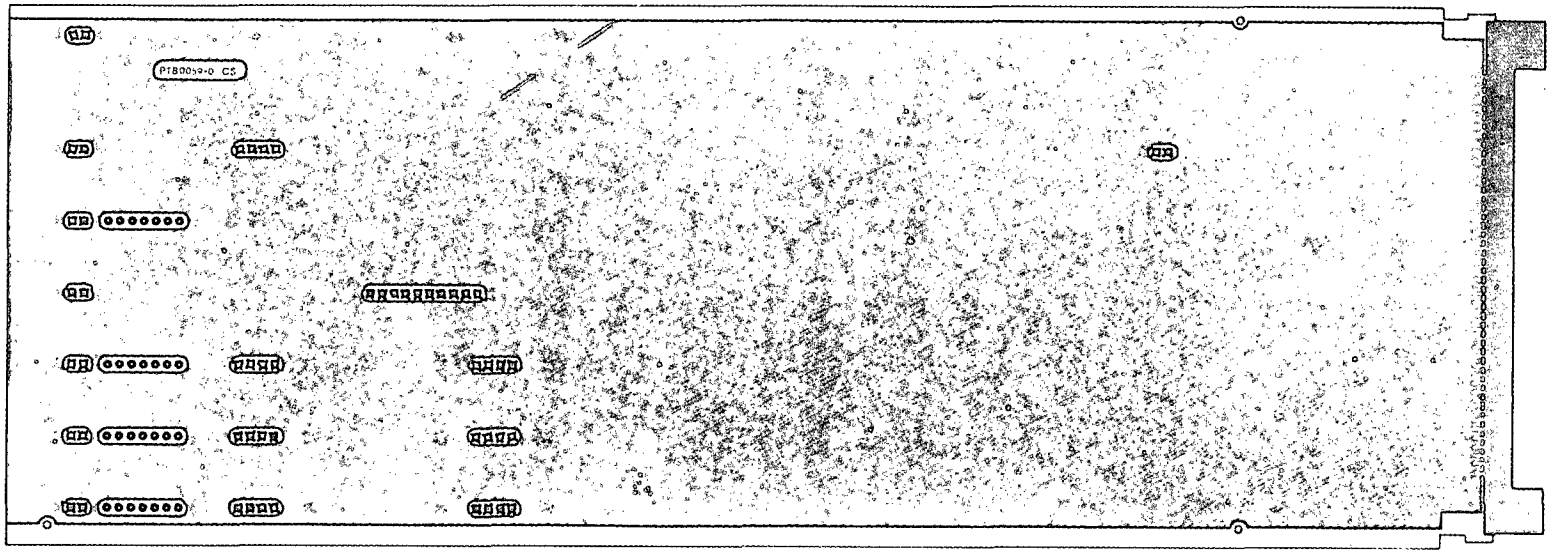
MACROMODULAR PROJECT

TITLE
PARTS LIST
LOAD TOP MOTHERBOARD ASSEMBLY
PART NO. 207.6

APPROVED BY	FOR	DATE	ENG. REO	DRAWING NO. 207.6D3
			DRAWN BY MBP	
			CHECKED WMK.	DATE 11-11-70



NOTE:
MALE AMPMODU PINS MUST BE INSTALLED
FROM THIS SIDE IN LOCATIONS MARKED X
PRECISELY AS SHOWN IN DWGS. 200.50D1
AND 200.50D2.

NOTE:
SEE DRAWING NUMBER 200.50D27
FOR CONNECTOR ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
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MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
LOAD BOTTOM MOTHERBOARD ASSEMBLY
PART NO. 207.7

APPROVED BY	APPROVED FOR	APPROVED DATE
Cam	MANUF.	17 Nov. 70
Cam	MANUF.	11/30/71

ENG.	DLS
DRAWN BY	PLL
CHECKED	NTK
DRAWING NO.	207.7D1
DATE	11-11-70

AMP CONNECTOR
1-202845-5
ONE REQUIRED

CONNECTORS
AMPMODU NO. 85931-5
88 REQUIRED

CIRCUIT BOARD
PTB0059-1
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION
1	7-27-71	E.C.O. 0214

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
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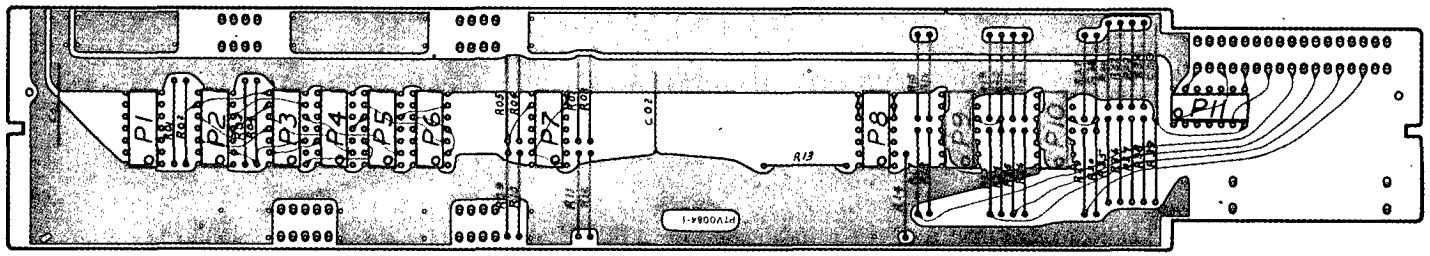
MACROMODULAR PROJECT

TITLE
PARTS LIST
LOAD BOTTOM MOTHERBOARD ASSEMBLY
PART NO. 207.7

APPROVED BY	FOR	DATE	ENG. REO	DRAWING NO. 207.7D2
			DRAWN BY MBP	
	PAUF.	11/20/71	CHECKED MK.	DATE 11-11-70

NOTE:
INSTALL FEMALE AMPMODU CONNECTORS
EXACTLY AS SHOWN ON DWG. 200.50D2.



CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
LOAD MODULE DATA BOARD
PART NO. 207.8

APPROVED BY	FOR	DATE
Cem	MANUF.	25 Nov. 70
Cem	MANUF.	11/30/71

ENG. R.E.O.
DRAWN BY DHO
CHECKED NTK
DRAWING NO. 207.8D1
DATE 11-18-70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M01B	2	P1 P8
M06	2	P9 P10
M10	2	P3 P6
M20	1	P11
M30	1	P7
M16	2	P4 P5
M47	1	P2

CAPACITORS*

TYPE	REQUIRED	LOCATION
10,000 pf	3	C01 C02 C03

*SPRAGUE TYPE CK-103
CERAMIC DISC 50 WVDC

RESISTORS

TYPE	REQUIRED	LOCATION
R0	2	R14 R39
R1	8	R05 R06 R07 R08 R35 R36 R37 R38
R2	8	R15 R16 R19 R20 R21 R22 R27 R28
R3	13	R01 R02 R03 R04 R09 R10 R11 R12 R13 R31 R32 R33 R34
R5	8	R17 R18 R23 R24 R25 R26 R29 R30

CONNECTORS
AMPMODU NO. 85863-4
52 REQUIRED

PRINTED CIRCUIT BOARD
PTV0084-2
ONE REQUIRED

NOTE:

R0 = JUMPERS
R1 = 1.5K OHM 1% FILM RESISTOR
R2 = 750 OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R5 = 57.6 OHM 1% FILM RESISTOR

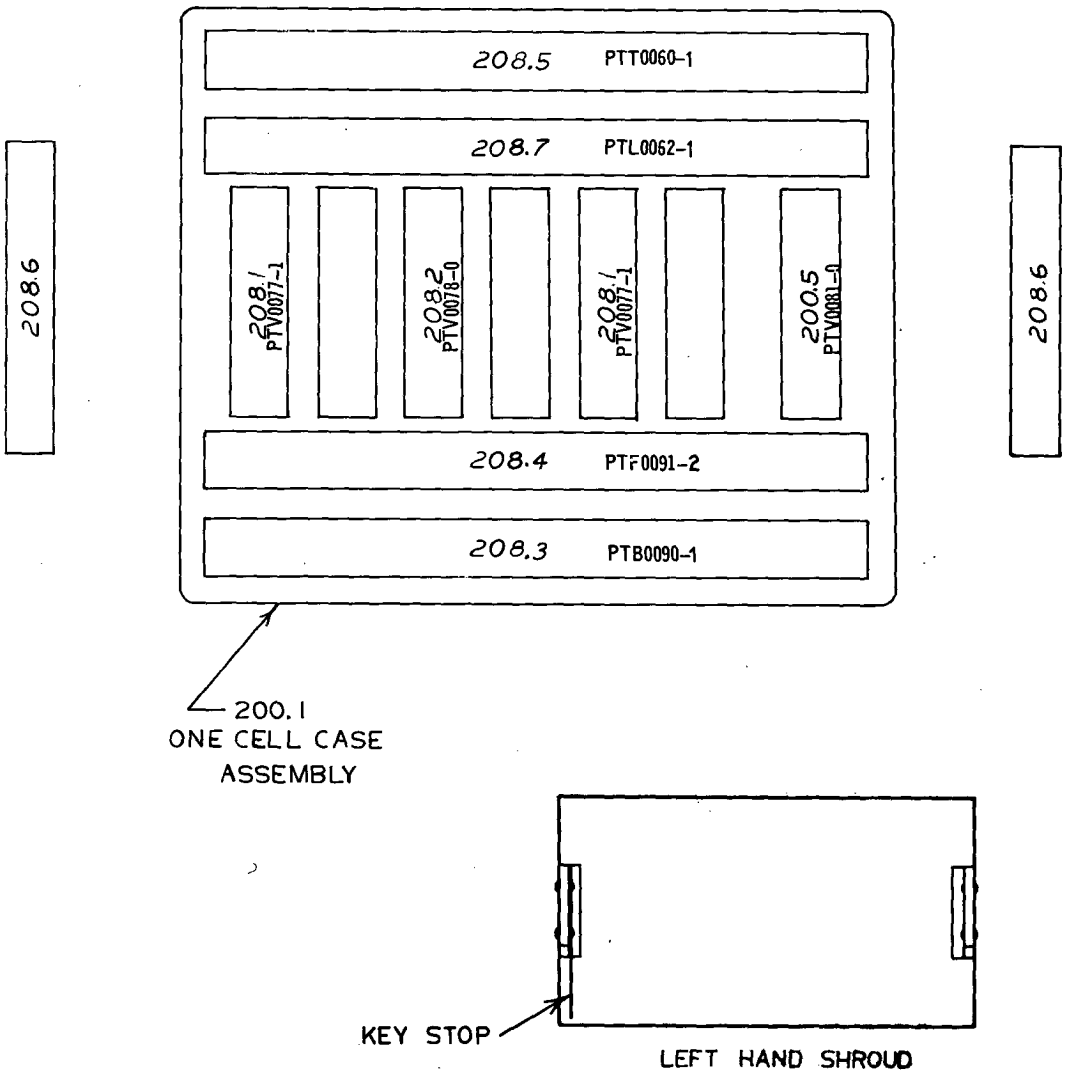
CHANGE NO.	DATE	DESCRIPTION
1	11-30-71	E.C.O. 0234 NTK

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
LOAD DATA BOARD
PART NO. 207.8

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
			REO	207.8D2
clm	MANUF.	25 Nov 70	DRAWN BY MBP	
clm	MANUF.	11/30/71	CHECKED NTK	DATE 11-18-70



CHANGE NO.	DATE	DESCRIPTION
5	7-27-71	E.C.O. 0215
4	11-9-70	CHG.DOC NO.- ADD BD. NOS.
3	6-19-70	NO. CHANGE ON L.M.B.
2	6-9-70	NEW PART NO. ON BMB
1	4-17-70	CHANGED TOP M.B.

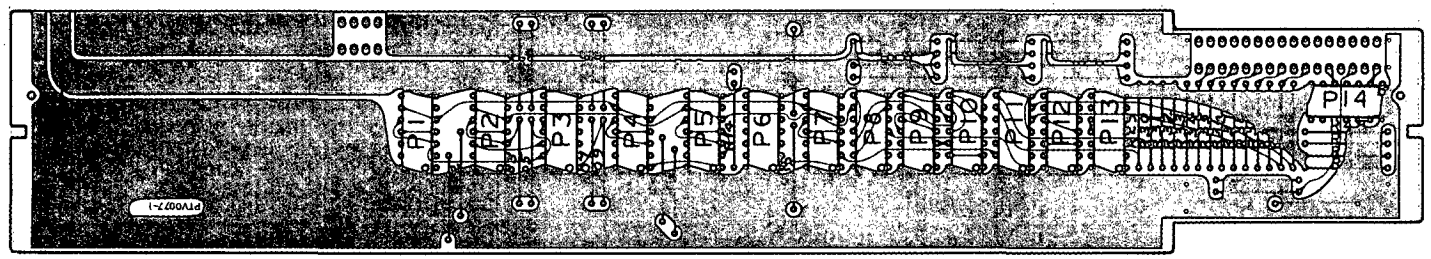
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE ASSEMBLY SCHEMATIC & PARTS LIST
CALL DECISION CALL UNIT
PART NO. 208

APPROVED BY	FOR	DATE
	Accumulator	4/8
		2/8/73

ENG	DRAWING NO.
WAC	208.0D
DRAWN BY: PLL	
CHECKED: NTK	DATE: 3-28-70



NOTE:
INSTALL FEMALE AMPMODU CONNECTORS
EXACTLY AS SHOWN ON DRAWING 200.50D2.

CHANGE NO.	DATE	DESCRIPTION
1	11/10/70	REPLACES PTV0070-0. Chan

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
CALL UNIT "D"-ELEMENT BOARD
PART NO. 208.1

APPROVED BY	FOR	DATE
Chan	MANUF.	2/8/72
Chan	MANUF.	2/8/72

ENG. REO
DRAWN BY PLL
CHECKED MK

DRAWING NO. 208.1D1
DATE 11/10/70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M10	6	P1
		P2
		P4
		P5
		P7
		P8
M01B	1	P6
M06	3	P11
		P12
		P13
M20	1	P14
M31	2	P9
		P10
M30	1	P3

CAPACITORS *

TYPE	REQUIRED	LOCATION
10,000 pf	2	C01
		C02

*CK-103 = SPRAGUE CERAMIC DISK
10,000 pf 50 WVDC

RESISTORS

TYPE	REQUIRED	LOCATION
R1	10	R04
		R06
		R08
		R10
		R13
		R16
		R19
		R20
		R45
		R46
R2	12	R21
		R22
		R23
		R24
		R25
		R26
		R27
		R28
		R29
		R30
		R31
		R32
R3	14	R01
		R02
		R03
		R05
		R07
		R09
		R11
		R12
		R14
		R15
		R17
		R18
		R47
		R48

RESISTORS (cont.)

TYPE	REQUIRED	LOCATION
R5	12	R33
		R34
		R35
		R36
		R37
		R38
		R39
		R40
		R41
		R42
		R43
		R44

CONNECTORS
AMPMODU NO. 85863-4
31 REQUIRED

CIRCUIT BOARD
PTV0077-1
ONE REQUIRED

NOTE:

R1 = 1.5K OHM 1% FILM RESISTOR
R2 = 750 OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R5 = 57.6 OHM 1% FILM RESISTOR

CHANGE NO.	DATE	DESCRIPTION
		0096

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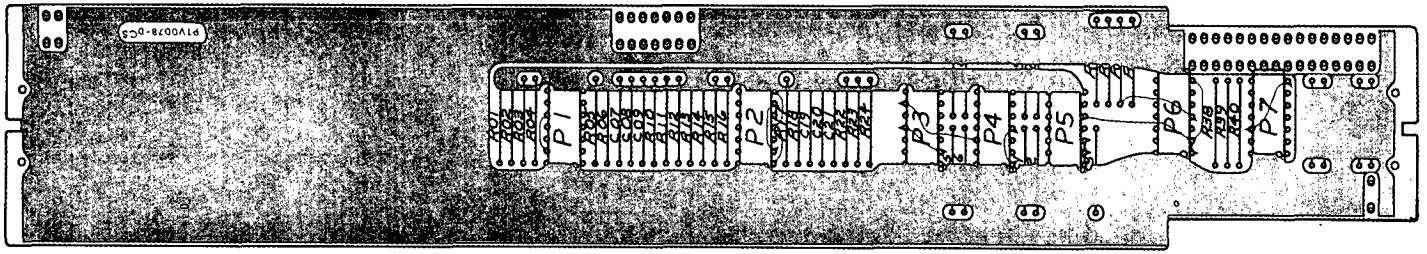
MACROMODULAR PROJECT

TITLE
PARTS LIST
CALL UNIT "D" ELEMENT BOARD
PART NO. 208.1

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
			DRAWN BY MBP	208.1D2
	MANUF.		CHECKED MTK	DATE 11-10-70

NOTE:
INSTALL FEMALE AMPMODU
CONNECTORS EXACTLY AS
SHOWN ON DWG. NUMBER
200.50D2.



CHANGE NO.	DATE	DESCRIPTION
1	11-9-70	ADD NOTE clm

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
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MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
CDC CONTROL BOARD
PART NO. 208.2

APPROVED BY	FOR	DATE
clm	MANUF.	25Nov.70
clm	MANUF.	

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 208.2D1
DATE 5-12-70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M01B	1	P5
M06	1	P4
M10	2	P1 P2
M20	2	P6 P7
M30	1	P3

CAPACITORS *

TYPE	REQUIRED	LOCATION
43 pf	2	C9 C19
50 pf	2	C8 C20
56 pf	2	C7 C21

*DIPPED SILVER MICA
5% 50 WVDC

RESISTORS

TYPE	REQUIRED	LOCATION
R0	5	R41 R42 R43 R44 R33
R1	6	R01 R02 R06 R13 R14 R18
R2	10	R10 R11 R12 R22 R23 R24 R27 R28 R29 R30
R3	13	R03 R04 R05 R15 R16 R17 R34 R35 R36 R37 R38 R39 R40

RESISTORS (cont)

TYPE	REQUIRED	LOCATION
R5	4	R25 R26 R31 R32

CONNECTORS
AMPMODU NO. 85863-4
35 REQUIRED

CIRCUIT BOARD
PTV0078-0
ONE REQUIRED

NOTE:

R0 = JUMPERS
R1 = 1.5K OHM 1% FILM RESISTOR
R2 = 750 OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R5 = 57.6 OHM 1% FILM RESISTOR

CHANGE NO.	DATE	DESCRIPTION
2	1-15-74	E.C.O. 0302
1	2-7-72	E.C.O. 0252

COMPUTER SYSTEMS LABORATORY
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MACROMODULAR PROJECT

TITLE: PARTS LIST
CDC CONTROL BOARD
PART NO. 208.2

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG. DCS	DRAWING NO. 208.2D2
	MANUF.	5/12/70	DRAWN BY MBP	
			CHECKED MTK.	DATE 6/23/70

Delay Test

Call Module Board #208.2

This board contains six delays whose values must be checked prior to the inclusion of the board in a module. The minimum value observed for each delay must lie in the range 37 nsec to 45 nsec, inclusive.

The values of the delays are affected by the amplitude of the input signal. In order to assure acceptable delay values for a wide range of input voltages, each delay is tested for two sets of voltages.

Procedure For Testing A Delay

Step 1. The delay has a pair of input pins (see chart below for pins). Connect one phase of a square wave to one of the pins and connect the other phase of the square wave to the other pin.

The square wave is to have a period of 700 nsec or more, rise and fall times of 10 nsec or less, and amplitudes of -0.60V and -1.00V.

Connect channels 1 and 2 of a 454 oscilloscope to the pins indicated in the chart and observe the interval between a transition on channel 1 and the subsequent transition on channel 2. The transitions will be in the same direction for delay #1 and delay #4 and will be in opposite directions for the other delays. Measuring from midpoint to midpoint, record the following times:

a). the interval beginning with a positive-going transition on channel 1.

b). the interval beginning with a negative-going transition on channel 1.

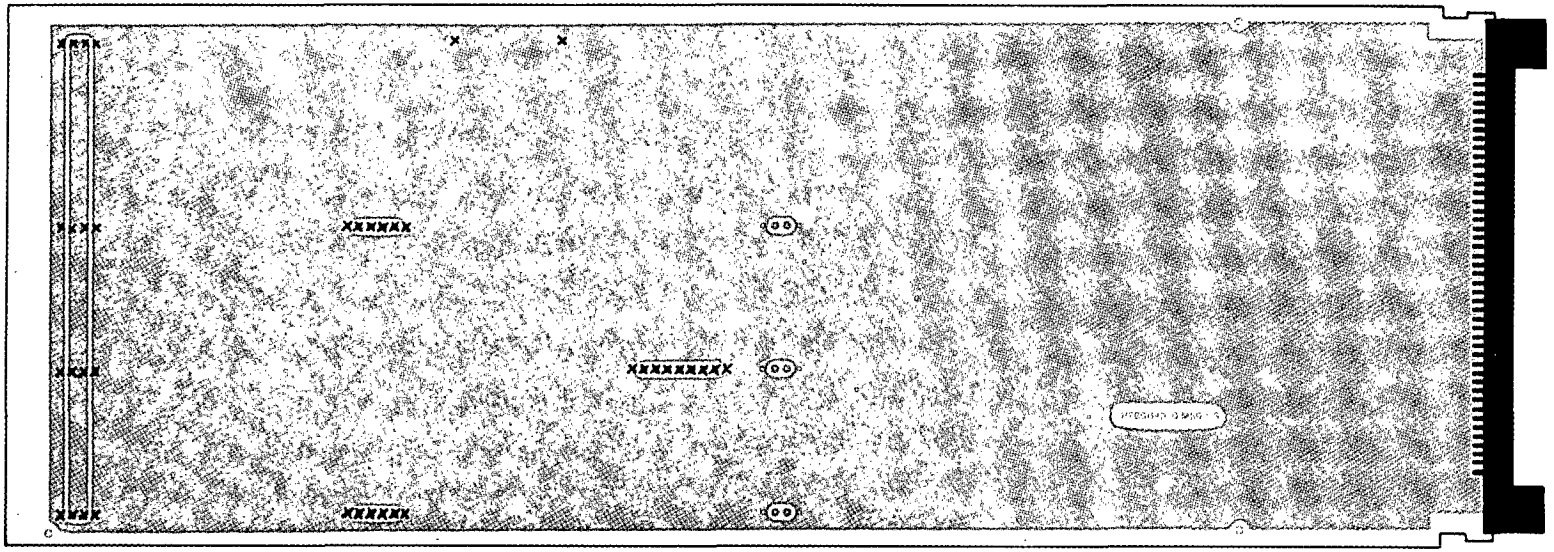
Step 2. This step is exactly the same as step 1 except that the square wave amplitudes are -1.50V and -1.90V.

Step 3. From the values recorded in steps 1 and 2, determine the minimum recorded value. If this value does not lie in the range 37 nsec to 45 nsec, change the value of the capacitor indicated in the chart and then repeat steps 1, 2, and 3. A capacitor change of 5 pf will change the delay about 2 nse

Delay	Input Pins	Ch.1	Ch.2	Capacitor
1	F8, F9	F9	B40	C19
2	F14, F15	F15	B41	C20
3	F16, F17	F17	B42	C21
4	F4, F5	F5	B43	C09
5	F10, F11	F11	B44	C08
6	F12, F13	F13	B45	C07

The final capacitor values and the measured delays for each board should be recorded on the test sheet provided for that board, along with the serial number of the board.

The circuit board should be carefully inspected to insure that the foregoing procedure has not resulted in damage to the circuit board, particularly in the areas where fresh soldering has taken place. All flux residues should be thoroughly removed.



NOTE:
AMPMODU PINS MUST BE INSTALLED
FROM THIS SIDE IN LOCATIONS MARKED
X PRECISELY AS SHOWN IN DWGS. 200.50D1
AND 200.50D2.
(39 PINS)

NOTE:
SEE DRAWING NUMBER 200.50D27
FOR CONNECTOR ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
CALL BOTTOM MOTHERBOARD ASSEMBLY
PART NO. 208.3

APPROVED BY	FOR	DATE
Clem	MANUF	25Nov70
Clem	MANUF	8Feb72

ENG. Reed
DRAWN BY PLL
CHECKED JJR
DRAWING NO. 208.3D1
DATE 11/10/70

CONNECTOR
AMP 1-202 845-5
ONE REQUIRED

CONNECTORS
AMPMODU NO. 85931-5
THIRTY NINE REQUIRED

CIRCUIT BOARD
PTB0090-1
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION
1	7-15-71	E.C.O. 0205

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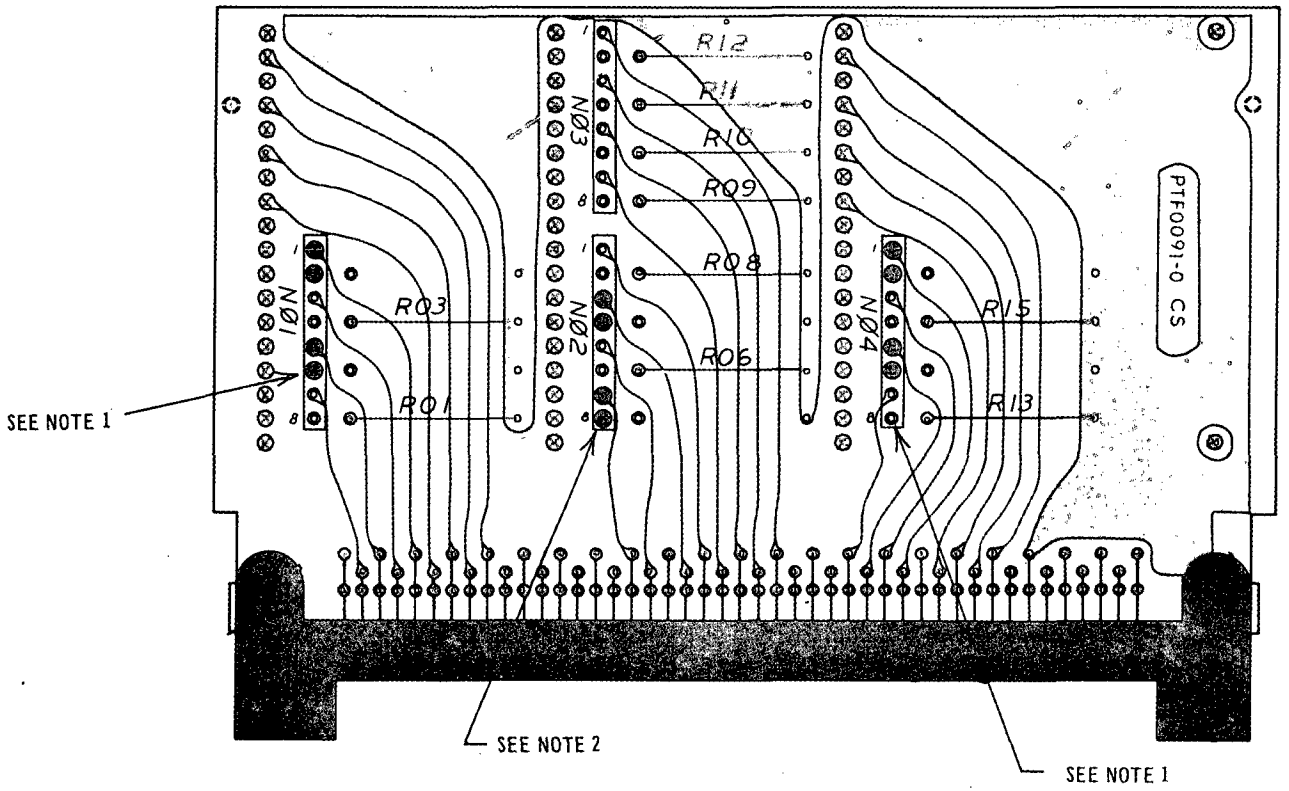
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
CALL BOTTOM MOTHERBOARD ASSEMBLY
PART NO. 208.3

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
	MANUF.	6/22/70	DRAWN BY MBP	208.3D2
			CHECKED	DATE 11-10-70



NOTE 1: CLIP PINS 1, 2, 5 AND 6 ON LTN-2 IN POSITION N01 AND N04.

NOTE 2: CLIP PINS 3, 4, 7 AND 8 ON LTN-2 IN POSITION N02.

NOTE 3: AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.

NOTE 4: SEE DRAWING NUMBER 200.50D29 FOR CONNECTOR ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION
2	11-10-70	ADDED LTN-2 IN N01 AND N04 Clm
1	6-23-70	Added Note Clm

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
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MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
CALL UNIT FACEPLATE MOTHERBOARD ASSEMBLY
PART NO. 208.4

APPROVED BY	FOR	DATE
Clm	MANUF	25Nov70
Clm	MANUF.	8Feb72

ENG. REO
DRAWN BY PLL
CHECKED MTK
DRAWING NO. 208.4D1
DATE 6/8/70

RESISTORS 15K OHM ¼WATT 5% CARBON COMP
TEN REQUIRED
- R01
- R03
- R06
- R08
- R09
- R10
- R11
- R12
- R13
- R15

SPRAGUE NETWORK LTN-2
FOUR REQUIRED
- N01 *
- N02 *
- N03
- N04 *

AMP CONNECTOR 583464-1
ONE REQUIRED

CONNECTORS
AMPMODU NO. 85931-5
56 REQUIRED

CIRCUIT BOARD
PTF0091-2
ONE REQUIRED

*NOTE: CLIP PINS 1, 2, 5 AND 6 ON LTN-2 IN POSITION N01 AND N04.
CLIP PINS 3, 4, 7 AND 8 ON LTN-2 IN POSITION N02.

CHANGE NO.	DATE	DESCRIPTION
3	7-20-72	CORR. REV. LEVEL ON P.C. BOARD
2	7-15-71	E.C.O. 0205
1	11-10-70	ADD INFO.

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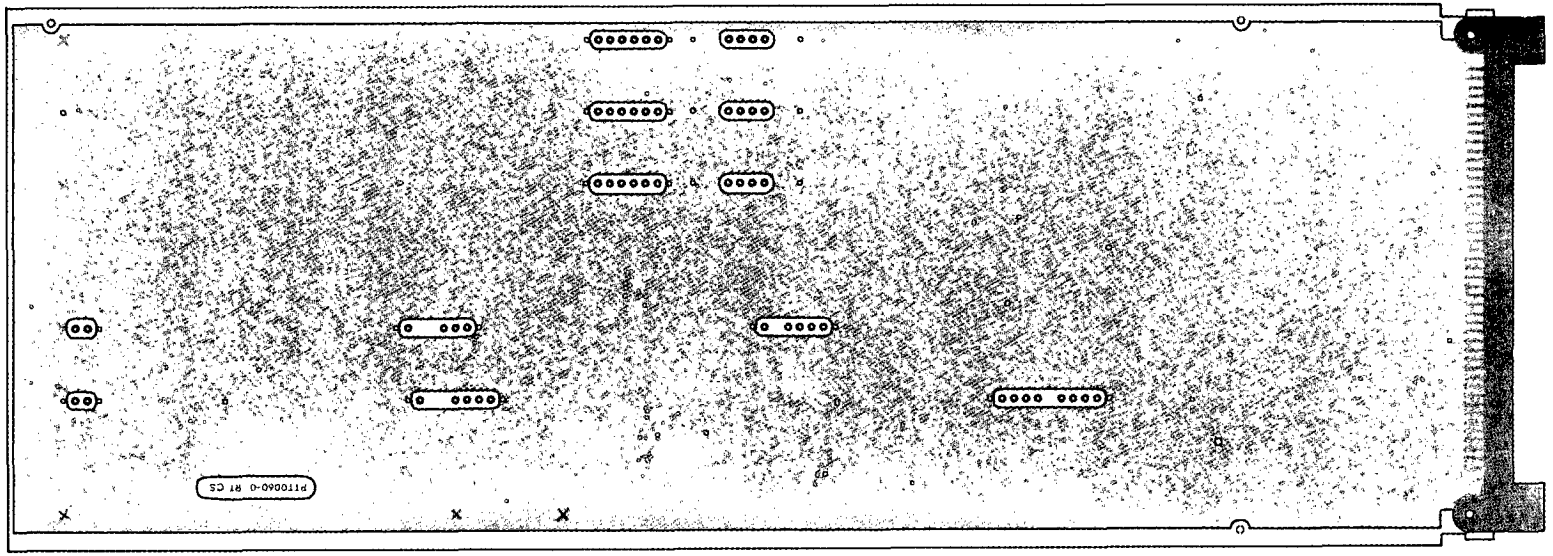
MACROMODULAR PROJECT

TITLE
PARTS LIST
CALL UNIT FACEPLATE MOTHERBOARD ASSEMBLY

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
	MANUF	6723770	REO	208.4D2
	MNFR	EFF. 72	DRAWN BY MBP	
			CHECKED MTK	DATE 11-10-70



NOTE:
SEE DRAWING NUMBER 200.50D26
FOR CONNECTOR ORIENTATION.

NOTE:
MALE AMPMODU PINS MUST BE
INSTALLED FROM THIS SIDE IN
LOCATIONS MARKED X PRECISELY
AS SHOWN IN DRWGS. 200.50D1
AND 200.50D2.
(6 PINS)

CHANGE NO.	DATE	DESCRIPTION

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MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
CALL TOP MOTHERBOARD ASSEMBLY
PART NO. 208.5

APPROVED BY	FOR	DATE
Clm	MANUF.	25Nov.70
Clm	MANUF.	8 Feb. 71

ENG.	DLS
DRAWN BY	PLL
CHECKED	NTK

DRAWING NO.	208.5D1
DATE	11/10/70

CONNECTOR AMP 1-202845-5
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
SIX REQUIRED

CIRCUIT BOARD
PTT0060-1
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION
1	7-15-71	E.C.O. 0205

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MACROMODULAR PROJECT

TITLE
PARTS LIST
CALL TOP MOTHERBOARD ASSEMBLY
PART NO. 208.5

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
	MANUF	4/20/70	DRAWN BY MBP	208.5D2
			CHECKED MK	DATE 11-10-70

METALCRAFT "AUTOGRAPH" OR EQUIVALENT: BLANK SIZE: ¼" X 2" SHEARED WITH SQUARE CORNERS. BLACK LETTERS, VOGUE BOLD 12 POINT BOLD FACE TYPE CENTERED TOP, BOTTOM AND SIDES WITH 6 POINT SPACING ON GREY BLUE PMS 550 BACKING. MANUFACTURED FROM .016 THICK ALUMINUM WITH SOLVENT ACTIVATED PERMANENT ADHESIVE BACKING.

NOTE: PANTONE MATCHING SYSTEM (PMS)

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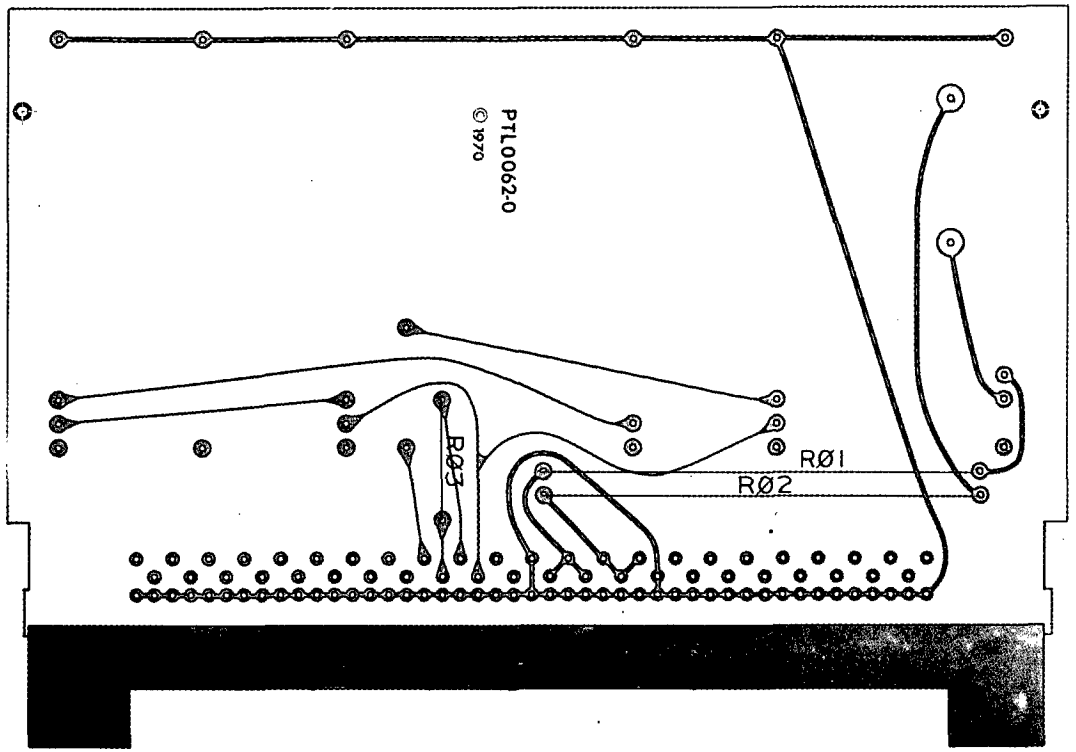
MACROMODULAR PROJECT

TITLE

IDENTIFICATION LABEL
CALL MODULE
PART #208.6

APPROVED			ENG	DRAWING NO.
BY	FOR	DATE	NTK	208.6D
MAW	Prod.	7/28/70	DRAWN BY KM	
			CHECKED MAW	DATE 6-16-70



CHANGE NO.	DATE	DESCRIPTION
1	11-10-70	REMOVE NOTE & AMPMODUS clm

COMPUTER SYSTEMS LABORATORY
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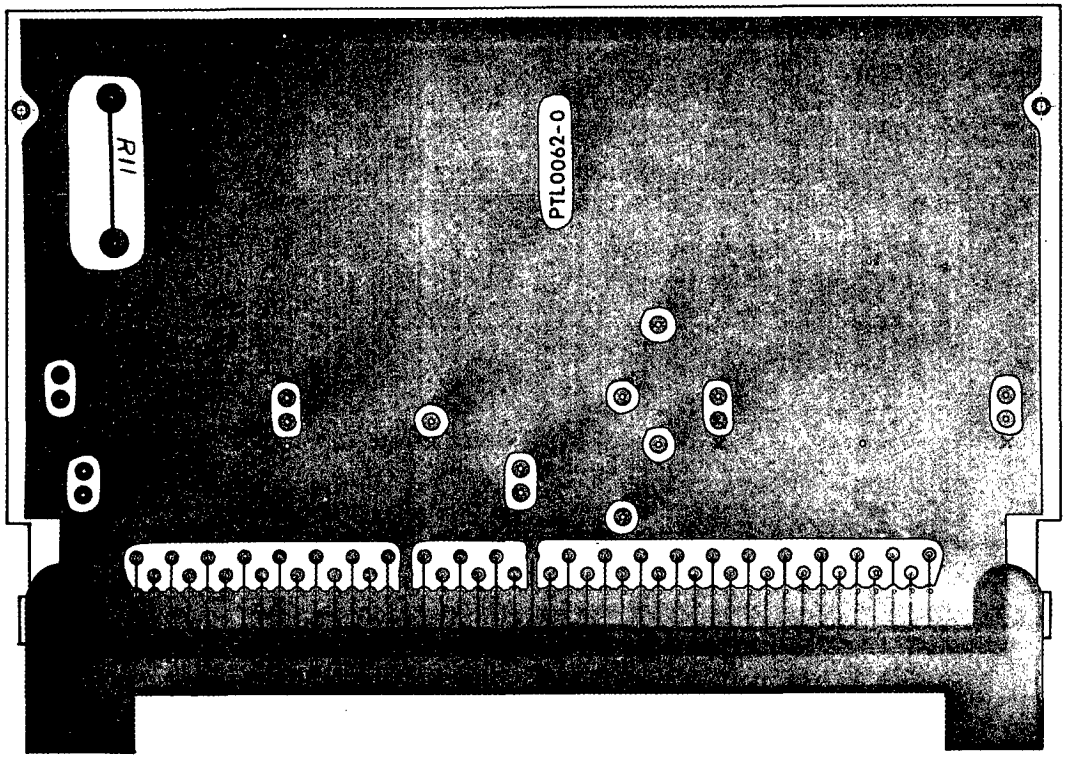
MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
CALL UNIT LATERAL MOTHERBOARD ASSEMBLY
PART NO. 208.7 SIGNAL SIDE

APPROVED BY	FOR	DATE
clm	MMUF	[illegible]
clm	MMUF	8 Feb. 72

ENG. DLS
DRAWN BY PLL
CHECKED MK.
DRAWING NO. 208.701
DATE 6/23/70

NOTE:
AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.



NOTE:
SEE DRAWING NUMBER 200.50D28 FOR CONNECTOR ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
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MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
CALL LATERAL MOTHERBOARD ASSEMBLY
PART NO. 208.7 COMPONENT SIDE

APPROVED BY	FOR	DATE
clm	MANUF.	25Nov.70
clm	MANUF.	8 Feb 72

ENG. DLS
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 208.7D2
DATE 11/10-70

JUMPERS
TWO REQUIRED
R01
R02

SENSE RESISTOR
61.9K 1% FILM
ONE REQUIRED
R03

CONNECTOR AMP 583 464-1
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
ELEVEN REQUIRED

FUSE
BUSSMAN GFA ¾AMP
ONE REQUIRED
R11

CIRCUIT BOARD
PTL0062-1
ONE REQUIRED

25 Nov 70

CHANGE NO.	DATE	DESCRIPTION
4	7-15-71	E.C.O. 0205
3	1-15-71	E.C.O. 0148
2	12-11-70	E.C.O. 0128
1	11-10-70	ADD INFO.

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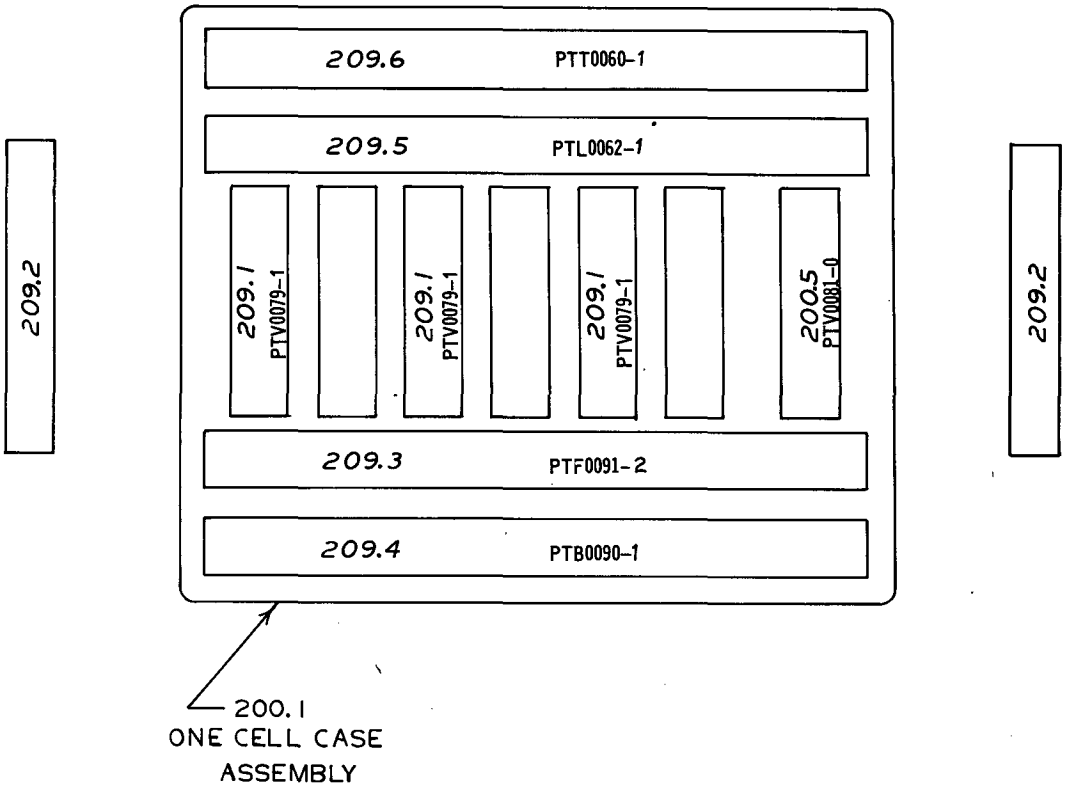
MACROMODULAR PROJECT

TITLE: PARTS LIST
CALL UNIT LATERAL MOTHERBOARD ASSEMBLY
PART NO. 208.7

APPROVED BY	FOR	DATE	ENG	DRAWING NO.
	MANUF	6/22/70	RETO	208.7D3
	MANUF	8 Feb 72	DRAWN BY MBP	
			CHECKED	DATE 11-10-70



200.1
ONE CELL CASE
ASSEMBLY

CHANGE NO.	DATE	DESCRIPTION
6	7-27-71	E.C.O. 0216 NTK.
5	10-6-70	ADDED P.C. BOARD NOS.
4	6-22-70	TITLE CHANGED
3	6-19 70	NO. CHANGE ON L.M.B.
2	6 9 70	NEW PART NO. ON FP & BMB
1	4-17 70	CHANGED TOP M.B.

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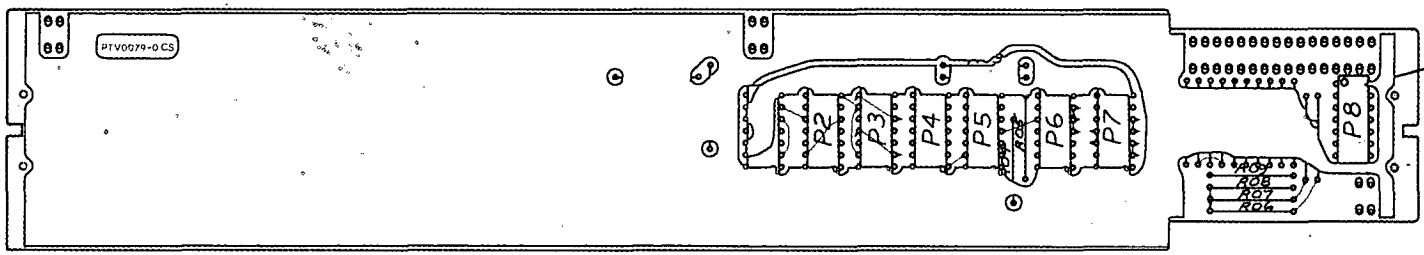
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE ASSEMBLY SCHEMATIC & PARTS LIST
MERGE RENDEZVOUS UNIT
PART NO. 209

APPROVED BY	APPROVED FOR	APPROVED DATE
NTK	Documentation	11/8
[illegible]	[illegible]	11-27-70

ENG	DRAWING NO.
WAC	209.0D
DRAWN BY: PLL	
CHECKED: NTK	DATE: 3-28-70



NOTE 1: INSTALL FEMALE AMPMODU CONNECTORS EXACTLY AS SHOWN ON DWG. 200.50D2 (31 REQUIRED)

2: NOTE ORIENTATION OF P8

CHANGE NO.	DATE	DESCRIPTION
1	10/9/70	ADD NOTES - DRK CBM

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
BRM BOARD
PART NO. 209.1

APPROVED BY	FOR	DATE
CBM	MANUF.	10/12/70
CBM	MANUF.	7/15/71

ENG. DLS
DRAWN BY PLL
CHECKED TKR

DRAWING NO. 209.1D1
DATE 5-11-70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M01	2	P6 P7
M10	3	P1 P2 P3
M11	1	P4
M20	1	P8
M30	1	P5

RESISTORS

TYPE	REQUIRED	LOCATION
R0	3	R01 R02 R03
R1	5	R05 R06 R07 R08 R09
R3	5	R04 R18 R19 R20 R21
R4	1	R22
R5	8	R10 R11 R12 R13 R14 R15 R16 R17

CONNECTORS
AMPMODU NO 85863-4
31 REQUIRED

CIRCUIT BOARD
PTV0079-1
ONE REQUIRED

NOTE

R0 = JUMPERS
R1 = 1 5K OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R4 = 15K OHM 5% CARBON COMP
R5 = 57 6 OHM 1% FILM RESISTOR

CHANGE NO	DATE	DESCRIPTION
1	7-15-71	E.C.O. 0204

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
BRM BOARD
PART NO 209 1

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG	DRAWING NO
Cam	MANUF	5/11/70	REO	209.1D2
			DRAWN BY MBP	
			CHECKED MTR	DATE 6/22/70

NOTE: NOT TO SCALE

METALCRAFT "AUTOGRAPH" OR EQUIVALENT:
BLANK SIZE: ¼" X 2" SHEARED WITH
SQUARE CORNERS. WHITE LETTERS, VOGUE
BOLD 12 POINT BOLD FACE TYPE EVENLY
SPACED, CENTERED TOP, BOTTOM AND
SIDES ON BLUE PMS 301 BACKING.
MANUFACTURED FROM .016 THICK ALUMINUM
WITH SOLVENT ACTIVATED PERMANENT
ADHESIVE BACKING.

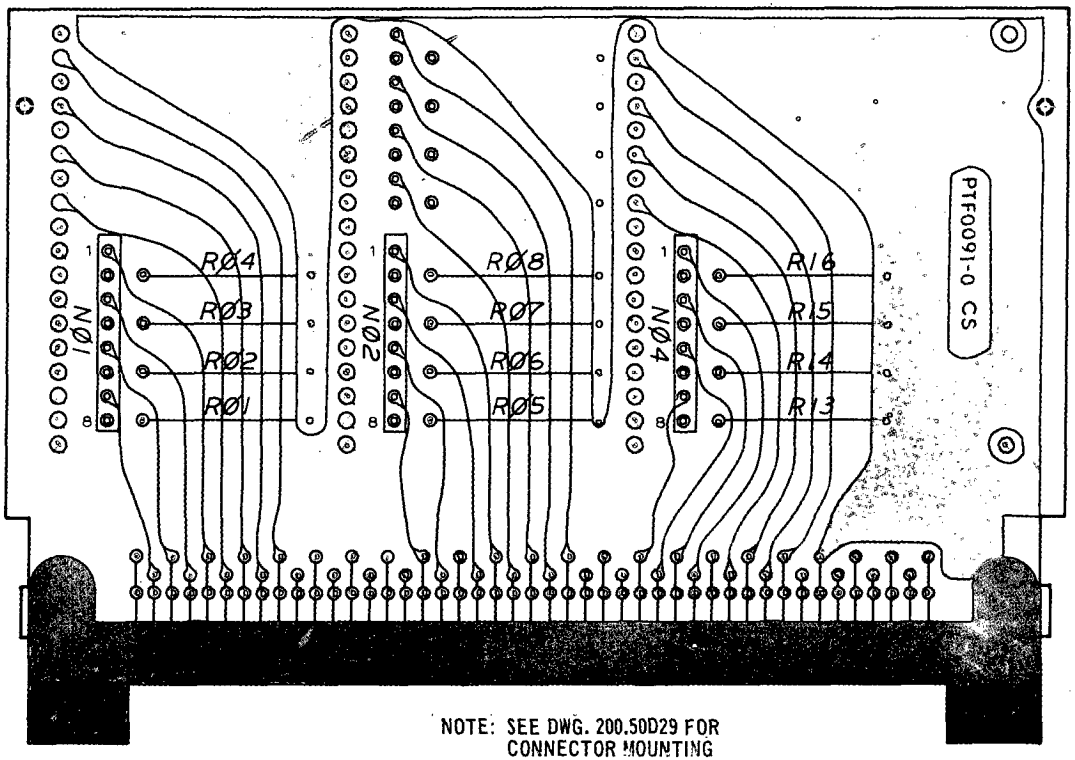
NOTE: PANTONE MATCHING SYSTEM (PMS)

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: IDENTIFICATION LABEL
MERGE/RENDEZVOUS MODULE
PART #209.2

APPROVED			ENG	DRAWING NO.
BY	FOR	DATE	NTK	
maw	Product.	7/28/70	DRAWN BY MBP	.209.2D
			CHECKED maw	DATE 7/23/70



NOTE: SEE DWG. 200.50D29 FOR CONNECTOR MOUNTING ORIENTATION.

NOTE: MALE AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DWGS. 200.50D1 AND 200.50D2 (56 PINS)

CHANGE NO.	DATE	DESCRIPTION
1	11-13-70	E.C.O. 0082 MTK cm

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
MERGE/RENDEZVOUS FACEPLATE MOTHERBOARD ASSEMBLY
PART NO. 209.3

APPROVED BY	FOR	DATE
Cem	MANUF.	10/12/70
Cem	MANUF.	11/15/71

ENG. REO
DRAWN BY PLL
CHECKED MTK.
DRAWING NO. 209.3D1
DATE 6/8/70

RESISTORS 15K OHM 5% ¼WATT CARBON COMP
TWELVE REQUIRED
- R01
- R02
- R03
- R04
- R05
- R06
- R07
- R08
- R13
- R14
- R15
- R16

SPRAGUE NETWORK LTN-2
THREE REQUIRED
- N01
- N02
- N04

AMP CONNECTOR 583464-1
ONE REQUIRED

CONNECTORS
AMPMODU NO·85931-5
FIFTY-SIX REQUIRED

CIRCUIT BOARD
PTF0091-2
ONE REQUIRED

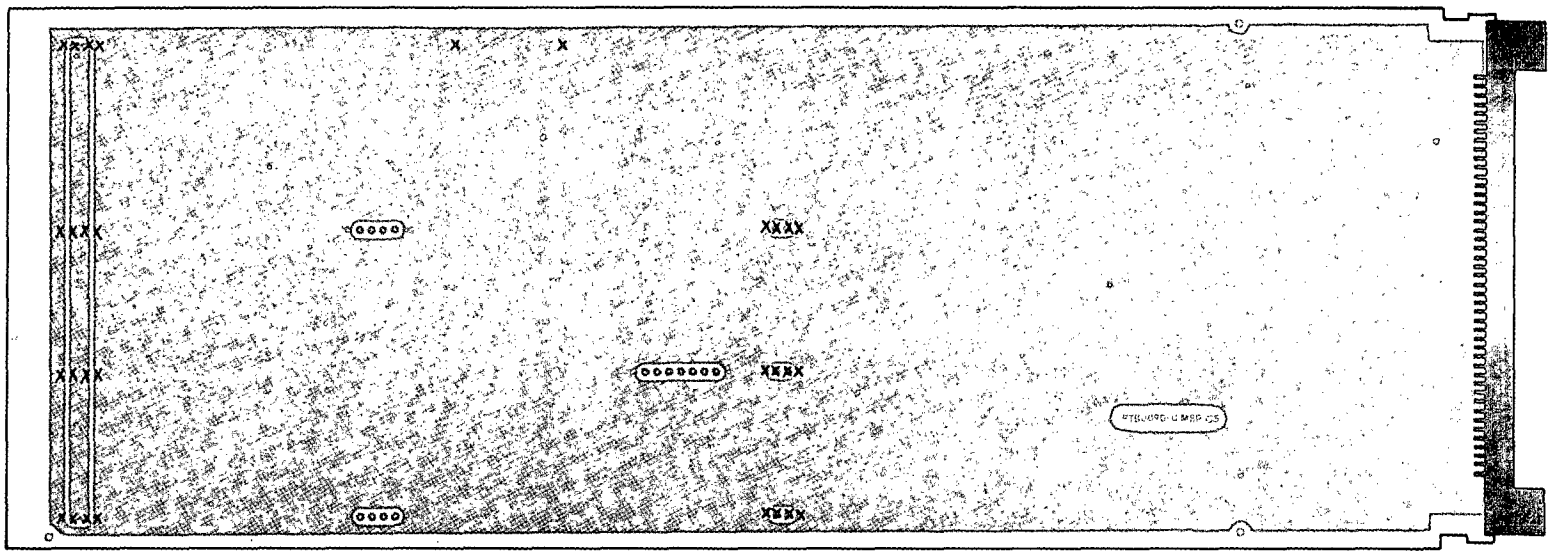
CHANGE NO	DATE	DESCRIPTION
2	7-20-72	CORR REV LEVEL ON PC. BOARD
1	7-15-71	E C O. 0204

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
MERGE/RENDEZVOUS FACEPLATE MOTHERBOARD ASSEMBLY

APPROVED BY	FOR	DATE	ENG	DRAWING NO
Cam	MANUF	6/22/70	DRAWN BY MBP	209.3D2
			CHECKED	DATE 10-8-70



NOTE: AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DWGS. 200.50D1 AND 200.50D2 (30 PINS)

NOTE: SEE DWG NUMBER 200.5D27 FOR CONNECTOR MOUNTING ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION
1	10/5/70	REMOVED EXTRA AMPMODU PINS

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
MERGE/RENDEZVOUS BOTTOM MOTHERBOARD ASSEMBLY
PART NO. 209.4

APPROVED BY	FOR	DATE
CRM	MANUF.	10/12/70
CRM	MANUF.	7/15/71

ENG. DLS
DRAWN BY PLL
CHECKED MK

DRAWING NO. 209.4D1
DATE 6-23-70

CONNECTOR
AMP 1-202 845-5
ONE REQUIRED

CONNECTORS
AMPMODU NO 85931-5
THIRTY REQUIRED

CIRCUIT BOARD
PTB0090-1
ONE REQUIRED

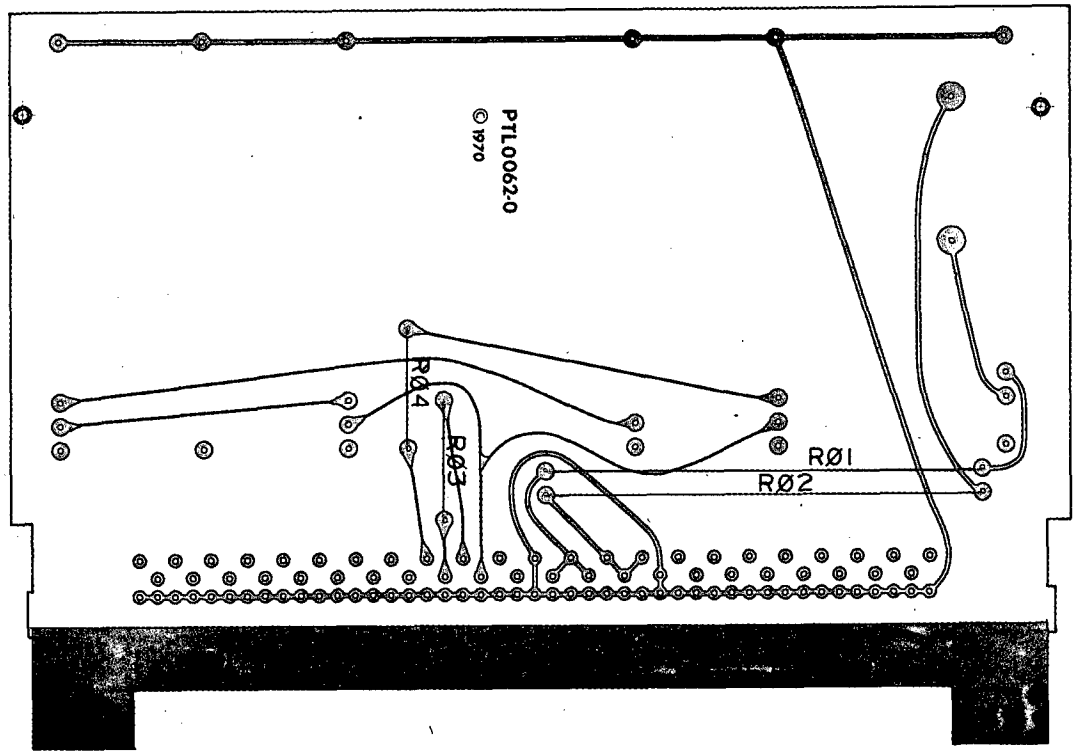
CHANGE NO	DATE	DESCRIPTION
2	7-15-71	E C O. 0204
1	10-5-70	CHANGED NO OF AMPMODU PINS

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
MERGE/RENDEZVOUS BOTTOM MOTHERBOARD ASSEMBLY
PART NO 209.4

APPROVED BY	FOR	DATE	ENG REO	DRAWING NO
Cam	MANUF	6/22/70	DRAWN BY MBP	209.4D2
			CHECKED TTK	DATE 6/22/70



CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

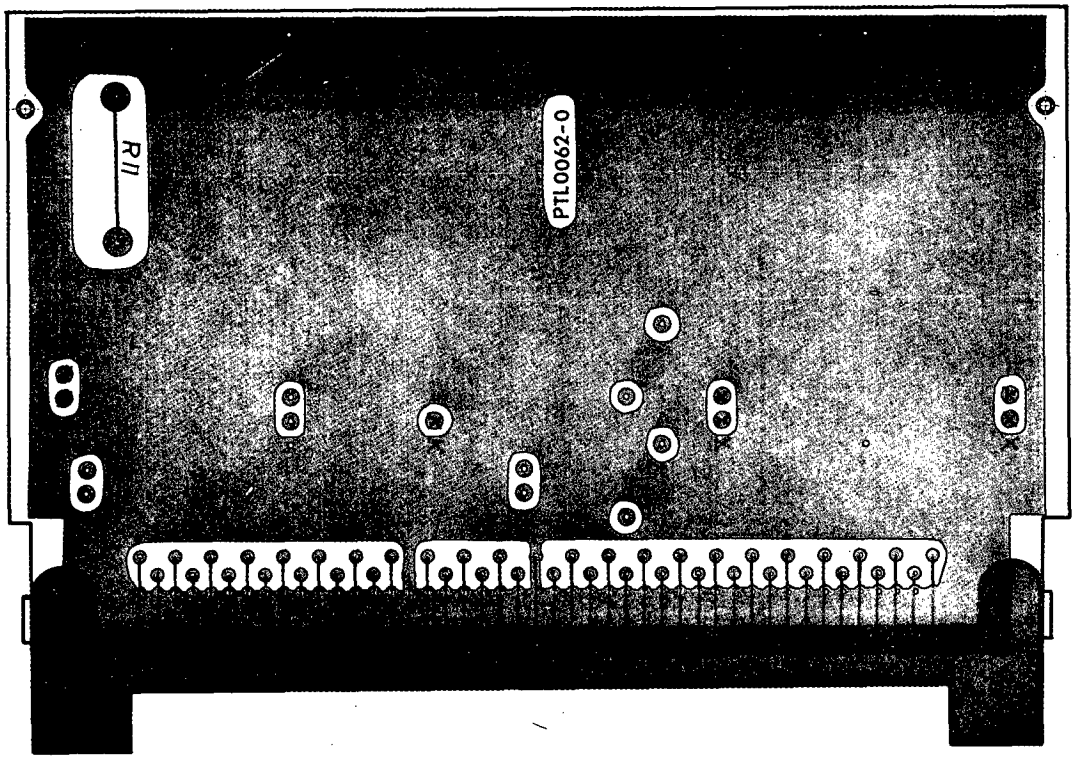
MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
MERGE/RENDEZVOUS LATERAL MOTHERBOARD ASSEMBLY
PART NO. 209.5

APPROVED BY	FOR	DATE
Cem	MANUF.	10/12/70
Cem	MANUF.	7/15/71

ENG. DLS
DRAWN BY PLL
CHECKED MK

DRAWING NO. 209.5D1
DATE 6/23/70



NOTE: MALE AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.
(15 PINS)

PLATED-THROUGH HOLES NOT CONTAINING COMPONENT LEADS SHALL BE KEPT FREE OF SOLDER.
(8 HOLES)

SEE DRAWING NUMBER 200.50D28 FOR CONNECTOR MOUNTING ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
MERGE/RENDEZVOUS LATERAL MOTHERBOARD ASSEMBLY
COMPONENT SIDE

APPROVED BY	FOR	DATE
Cem	MANUF.	10/23/70
Cem	MANUF.	7/15/71

ENG. REO
DRAWN BY
CHECKED MTK
DRAWING NO. 209.5D2
DATE 10/10/70

CONNECTOR AMP 583 464-1
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
FIFTEEN REQUIRED

FUSE BUSSMAN GFA THREE-QUARTER AMP
ONE REQUIRED
R11

JUMPERS
THREE REQUIRED
R01
R02
R04

SENSE RESISTOR
95.3K 1% FILM
ONE REQUIRED
R03

CIRCUIT BOARD
PTL0062-1
ONE REQUIRED

CHANGE NO.	DATE	DESCRIPTION
1	7-15-71	E.C.O. 0204

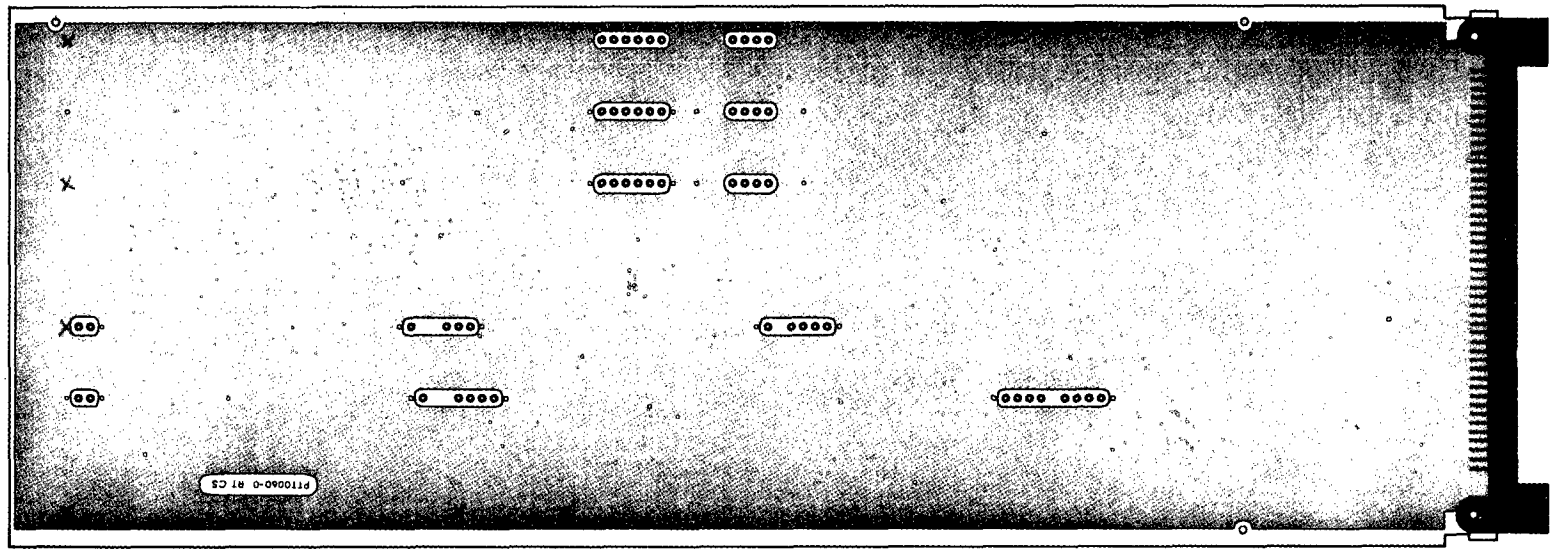
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
MERGE/RENDEZVOUS LATERAL MOTHER BOARD ASSEMBLY

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG. REO	DRAWING NO. 209.5D3
cem	MANUF.	5/15/70	DRAWN BY MBP	
		7/15/71	CHECKED TMK	DATE 10-9-70

NOTE: MALE AMPMODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.
(6 PINS)



NOTE: SEE DRAWING NUMBER 200.50D26 FOR CONNECTOR MOUNTING ORIENTATION.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
MERGE/RENDEZVOUS TOP MOTHERBOARD ASSEMBLY

APPROVED BY	FOR	DATE
CAM	MANUF	10/26/70
CAM	MANUF.	7/15/71

ENG. REO
DRAWN BY
CHECKED JDK

DRAWING NO. 209.6D1
DATE 10/5/70

CONNECTOR AMP 1-202845-5
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
SIX REQUIRED

CIRCUIT BOARD
PTT0060-1
ONE REQUIRED

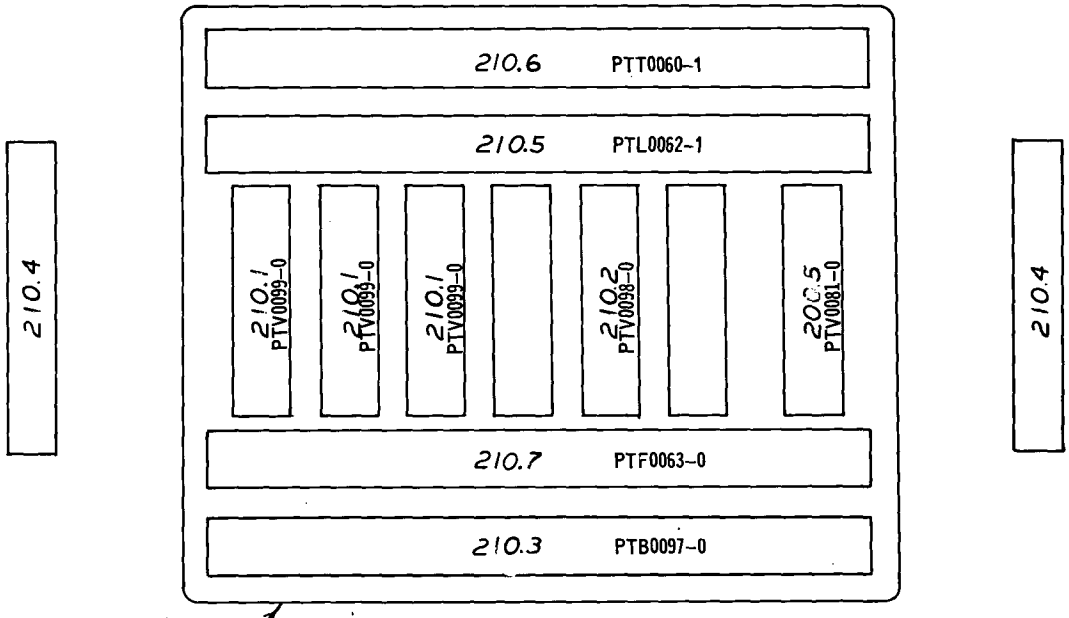
CHANGE NO.	DATE	DESCRIPTION
1	7-15-71	E.C.O. 0204

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

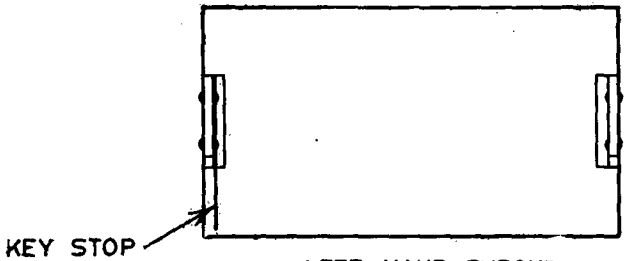
MACROMODULAR PROJECT

TITLE
PARTS LIST
MERGE/RENDEZVOUS TOP MOTHER BOARD

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
CRM	MANUF.	10/19/70	REO	209.6D2
			DRAWN BY MBP	
			CHECKED TMK	DATE 10-5-70



200.1
ONE CELL CASE
ASSEMBLY



LEFT HAND SHROUD

CHANGE NO.	DATE	DESCRIPTION
3	7-27-71	E.C.O. 0217 NTK
2	11-24-70	ADD BOARD NOS. NTK
1	6-19-70	NO. CHANGE ON L.M.B.

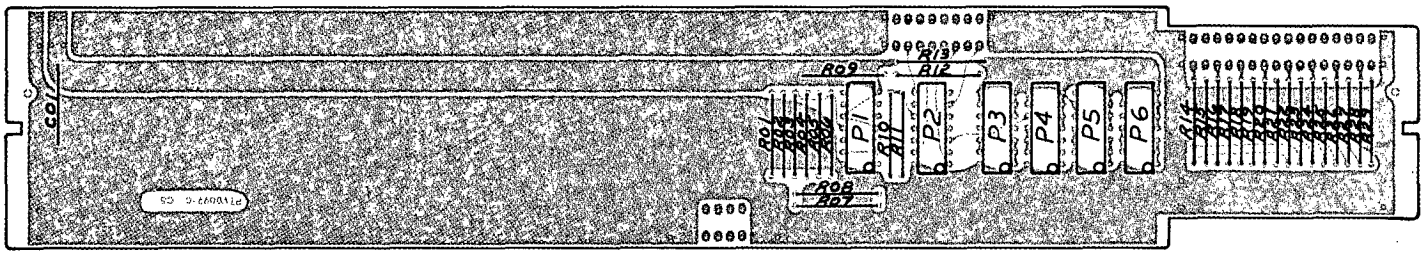
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE ASSEMBLY SCHEMATIC & PARTS LIST
DATA BRANCH
PART NO. 210

APPROVED BY	FOR	DATE
NTK	Document	4/20
		11-27-70

ENG WAC
DRAWN BY PLL
CHECKED NTK
DRAWING NO. 210.0D
DATE 4-16-70



NOTE: INSTALL FEMALE AMPMODU CONNECTORS EXACTLY AS SHOWN ON DRAWING 200.50D2.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DATA BRANCH MODULE DATA BOARD
PART NO. 210.1

APPROVED BY	APPROVED FOR	APPROVED DATE
Chas	MANUF	23 Nov 70

ENG. REO
DRAWN BY PLL
CHECKED MTK

DRAWING NO. 210.1D1
DATE 6/23/70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M01B	4	P3
		P4
		P5
		P6
M10	1	P1
M20	1	P2

CAPACITORS*

TYPE	REQUIRED	LOCATION
10,000pf	1	C01

*TYPE CK-103 SPRAGUE CERAMIC DISC, 50 WVDC

RESISTORS

TYPE	REQUIRED	LOCATION
R0	1	R13
R1	6	R04
		R05
		R06
		R08
		R09
		R10
R3	6	R01
		R02
		R03
		R07
		R11
		R12
R5	16	R14
		R15
		R16
		R17
		R18
		R19
		R20
		R21
		R22
		R23
		R24
		R25
		R26
		R27
		R28
		R29

CONNECTORS
AMPMODU NO. 85863-4
41 REQUIRED

CIRCUIT BOARD
PTV0099-0
ONE REQUIRED

NOTE:

R0 = JUMPERS
R1 = 1.5K OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R5 = 57.6 OHM 1% FILM RESISTOR

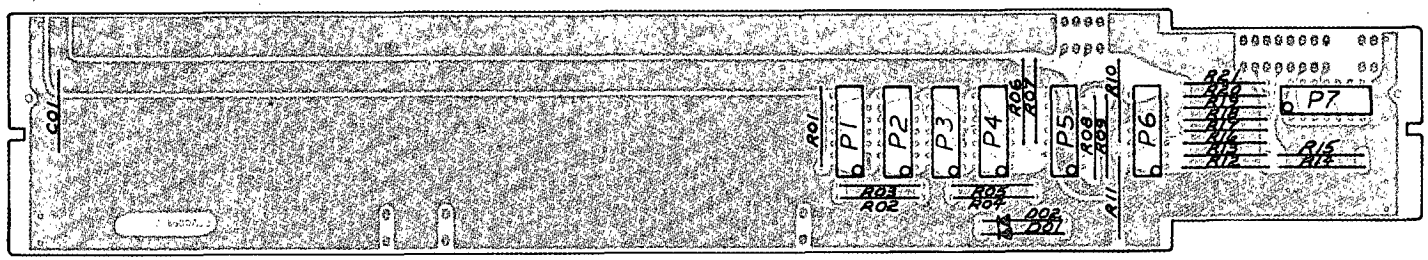
CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: PARTS LIST
DATA BRANCH MODULE DATA BOARD
PART NO. 210.1

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
Clem	MANUF.	11/23/70	REO	210.1D2
			DRAWN BY MBP	
			CHECKED MTK	DATE 11-5-70



NOTE: INSTALL FEMALE AMPMODU CONNECTORS EXACTLY AS SHOWN ON DRAWING 200.50D2

CHANGE NO.	DATE	DESCRIPTION
1	1-7-71	E.C.O. 0142 MTK.

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
DATA BRANCH MODULE CONTROL BOARD
PART NO. 210.2

APPROVED BY	FOR	DATE
Clem	MANUF.	23Nov.70

ENG. REO
DRAWN BY PLL
CHECKED MTK

DRAWING NO. 210.2D1
DATE 6/25/70

INTEGRATED CIRCUITS

TYPE	REQUIRED	LOCATION
M01B	1	P6
M08	1	P4
M10	2	P1 P3
M12	1	P2
M20	1	P7
M35	1	P5

DIODE – 1N3604
2 REQUIRED
D01
D02

CAPACITORS*

TYPE	REQUIRED	LOCATION
10,000 pf	1	C01

*SPRAGUE TYPE CK–103
CERAMIC DISC

RESISTORS

TYPE	REQUIRED	LOCATION
R1	7	R04 R05 R10 R14 R15 R16 R17
R3	3	R11 R12 R13
R4	4	R01 R02 R03 R09
R5	6	R06 R07 R21 R20 R19 R18
R6	1	R08

CONNECTORS
AMPMODU NO. 85863-4
32 REQUIRED

CIRCUIT BOARD
PTV0098–0
ONE REQUIRED

NOTE:

R1 = 1.5K OHM 1% FILM RESISTOR
R3 = 121 OHM 1% FILM RESISTOR
R4 = 15K OHM 5% ¼WATT CARBON COMP.
R5 = 57.6 OHM 1% FILM RESISTOR
R6 = 130 OHM 1% FILM RESISTOR

CHANGE NO.	DATE	DESCRIPTION
1	11–23–70	ADD INFO.

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
DATA BRANCH MODULE–CONTROL BOARD
PART NO. 210.2

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
	MANUF.	6/23/70	DRAWN BY MBP	210.2D2
			CHECKED	DATE 6/23/70

NOTE: SEE DRAWING NUMBER 200.50D27 FOR CONNECTOR ORIENTATION.

NOTE: 2

MALE AMP MODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DATA BRANCH BOTTOM MOTHERBOARD
PART NO. 210.3

APPROVED BY	FOR	DATE
Cma	MANUF.	23Nov.70

ENG REO
DRAWN BY PLL
CHECKED MTR

DRAWING NO. 210.3D1
DATE 7/8/70

CONNECTOR AMP 1-202845-5
ONE REQUIRED

CONNECTOR AMP MODU NO. 85931-5
FIFTY-EIGHT REQUIRED

CIRCUIT BOARD
PTB0097-0
ONE REQUIRED

SPRAGUE NETWORK LTN-2
THREE REQUIRED
N01
N02
N03

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
DATA BRANCH BOTTOM MOTHER BOARD
PART NO. 210.3

APPROVED BY	FOR	DATE	ENG. REO	DRAWING NO. 210.3D2
[illegible]	MANUF.	23 JUL 70	DRAWN BY KM	
			CHECKED MTK	DATE 7/8/70

DATA BRANCH

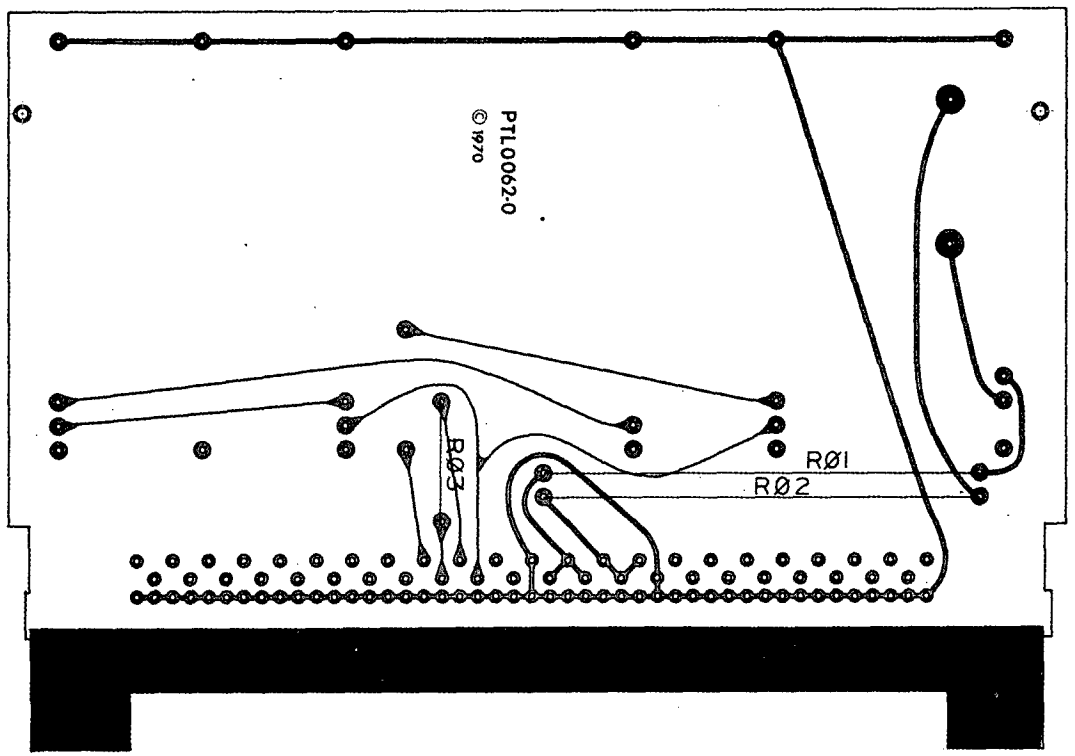
METALCRAFT "AUTOGRAPH" OR EQUIVALENT: BLANK SIZE: ¼" X 2" SHEARED WITH SQUARE CORNERS. WHITE LETTERS VOGUE BOLD 12 POINT BOLD FACE TYPE CENTERED TOP, BOTTOM AND SIDES WITH 6 POINT SPACING BETWEEN LETTERS AND ONE CHARACTER HEIGHT BETWEEN WORDS, ON RED PMS 200 BACKING. MANUFACTURED FROM .016 THICK ALUMINUM WITH SOLVENT ACTIVATED PERMANENT ADHESIVE BACKING.

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: IDENTIFICATION LABEL
DATA BRANCH MODULE
PART #210.4

APPROVED			ENG	DRAWING NO.
BY	FOR	DATE	NTK	210.4D
Maw	Prod.	7/28/70	DRAWN BY KM	
			CHECKED Maw	DATE 6-16-70



CHANGE NO.	DATE	DESCRIPTION

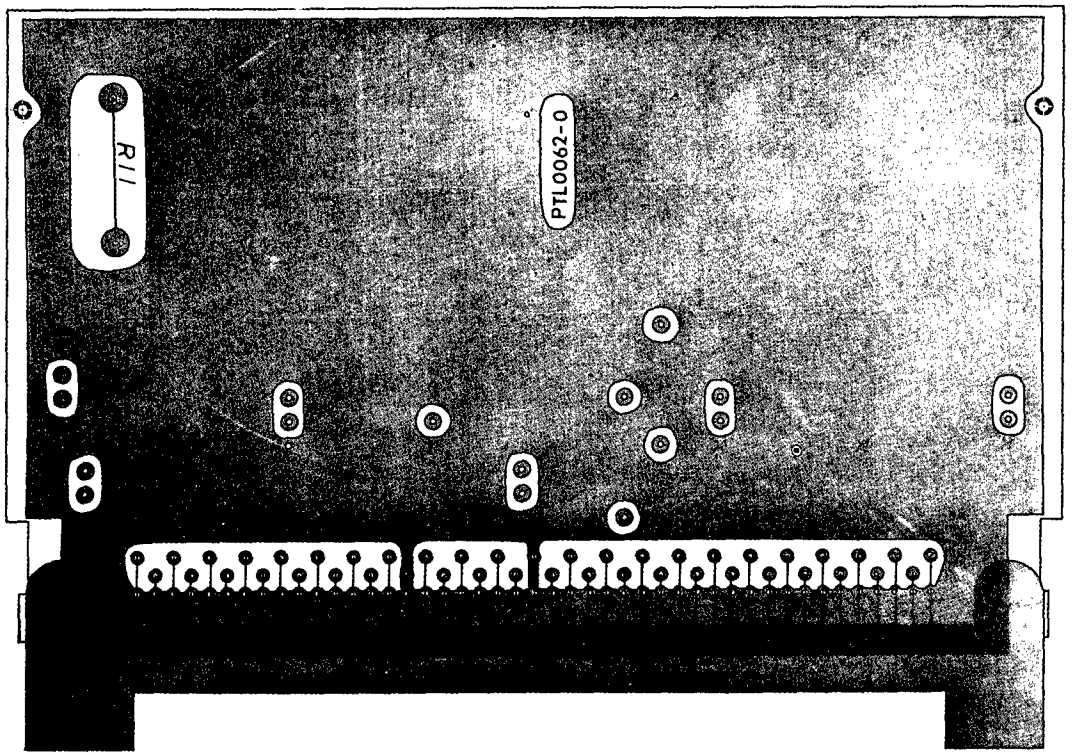
COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DATA BRANCH LATERAL MOTHERBOARD ASSEMBLY SIGNAL SIDE
PART NO. 210.5

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
Clm	MANUF.	2-3 Nov. 70	REO	210.5D1
			DRAWN BY PLL	
			CHECKED	DATE 6/23/70

NOTE:
AMP MODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.



NOTE:
SEE DRAWING NUMBER 200.50D28. FOR CONNECTOR ORIENTATION

CHANGE NO.	DATE	DESCRIPTION
1	11-6-70	E.C.O. 0076

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
DATA BRANCH LATERAL MOTHERBOARD ASSEMBLY COMPONENT SIDE
PART NO. 210.5

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG. REO	DRAWING NO. 210.5D2
Cam	MANUF.	24 Nov 70	DRAWN BY PLL	
			CHECKED NTK	DATE 4-17-70

JUMPERS
TWO REQUIRED
R01
R02

SENSE RESISTOR
80.6K 1% FILM
ONE REQUIRED
R03

CONNECTOR AMP 583 464-1
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
TWELVE REQUIRED

FUSE
BUSSMAN GFA ¾A
ONE REQUIRED
R11

CIRCUIT BOARD
PTL0062-1
ONE REQUIRED

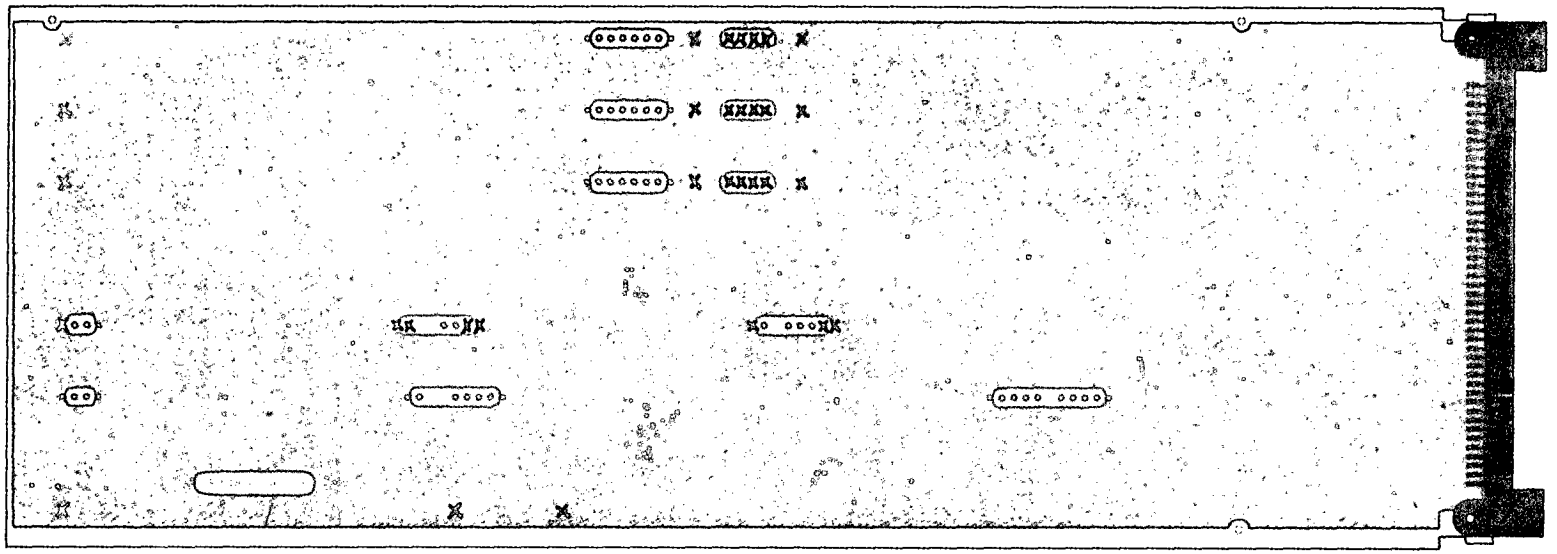
CHANGE NO.	DATE	DESCRIPTION
1	7-15-71	E.C.O. 0203

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
DATA BRANCH LATERAL MOTHERBOARD ASSEMBLY
PART NO. 210.5

APPROVED BY	FOR	DATE	ENG.	DRAWING NO.
C. [illegible]	MACRO.	23 Nov 70	REO	210.5D3
			DRAWN BY MBP	
			CHECKED [illegible]	DATE 11-5-70



NOTE:2SEE DRAWING 200.50D26
FOR CONNECTOR ORIENTATION

NOTE:1
MALE AMP MODU PINS MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.

CHANGE NO	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
COMPONENT IDENTIFICATION
DATA BRANCH TOP MOTHER BOARD ASSEMBLY
PART NO 210.6

APPROVED BY	FOR	DATE
Cam	MANUF.	23 NOV. 70

ENG REO
DRAWN BY MBP
CHECKED NTR
DRAWING NO 210.6D1
DATE 11-6-70

CONNECTOR AMP 1-202845-5
ONE REQUIRED

CONNECTOR
AMPMODU NO. 85931-5
THIRTY TWO REQUIRED

CIRCUIT BOARD
PTT0060- 1
ONE REQUIRED

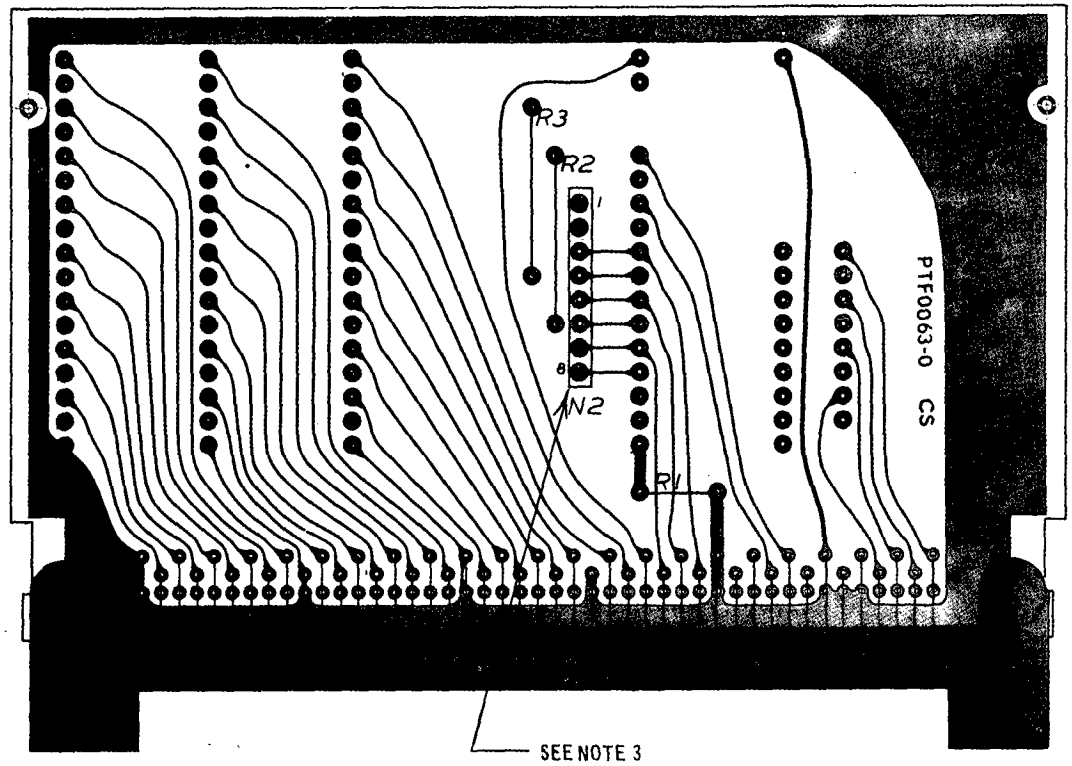
CHANGE NO.	DATE	DESCRIPTION
1	7-15-71	E.C.O. 0203

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE
PARTS LIST
DATA BRANCH TOP MOTHER BOARD ASSEMBLY
PART NO. 210.6

APPROVED BY	APPROVED FOR	APPROVED DATE	ENG.	DRAWING NO.
Conn	MANUF.	23 Nov. 70	REO	210.602
			DRAWN BY MBP	
			CHECKED TTR	DATE 11-5-70



NOTE 1:
MALE AMP MODU MUST BE INSTALLED FROM THIS SIDE IN LOCATIONS MARKED X PRECISELY AS SHOWN IN DRAWINGS 200.50D1 AND 200.50D2.

NOTE 2:
SEE DRAWING NUMBER 200.50D29 FOR CONNECTOR ORIENTATION.

NOTE 3:
ON SPRAGUE RESISTOR NETWORK IN POSITION N2, CLIP PINS 1, 2, 7 AND 8.

CHANGE NO.	DATE	DESCRIPTION

COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MISSOURI

MACROMODULAR PROJECT

TITLE: COMPONENT IDENTIFICATION
DATA BRANCH FACEPLATE MOTHERBOARD ASSEMBLY
PART NO. 210.7

APPROVED BY	FOR	DATE
Cerm	MANUF.	23 Nov 70

ENG. REO
DRAWN BY PLL
CHECKED MTK
DRAWING NO. 210.7D1
DATE 4-17-70

JUMPER
ONE REQUIRED
R1

RESISTOR 15K OHM ¼WATT 5% CARBON COMP.
TWO REQUIRED
R2
R3

NETWORK LTN-2
ONE REQUIRED (SEE NOTE)
N2

CONNECTOR
AMP 583 464-1
ONE REQUIRED

CONNECTOR
AMPMODU NO 85931-5
SIXTY EIGHT REQUIRED

CIRCUIT BOARD
PTF0063-1
ONE REQUIRED

*CLIP PINS 1, 2, 7 AND 8 BEFORE
INSERTING IN BOARD.

CHANGE NO	DATE	DESCRIPTION
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13. ABSTRACT

Manufacturing documents, including parts lists, assembly pictorials, and adjustment procedures for the DECODE, LOAD, CALL, MERGE and DATA BRANCH macromodule electronic subassemblies are given.

DD FORM 1 NOV 68 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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14. KEY WORDS	LINK A		LINK B		LINK C	
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MERGE Macromodule						
DATA BRANCH Macromodule						
Macromodule						
Emitter-Coupled Logic						
Asynchronous Logic						


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